



**KENT CAMPUS**

**Florida State College  
at Jacksonville  
Jacksonville, Florida**

# **ELEVATOR ADDITION, BUILDING E**

**PHASE III REVIEW  
November 8, 2018  
SPECIFICATIONS**



**KBJ-L&B Architects, LLC.  
50 N. Laura Street, Su 4200  
Jacksonville, FL 32202  
Comm. No. 0170**



**FSCJ Kent Campus Elevator Addition  
Building E  
Jacksonville, Florida**

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TABLE OF CONTENTS  
Commission No.0170

SPECIFICATIONS  
DIVISIONS 1 THROUGH 14, 31

\*\* Specification Section Prepared by Atlantic Engineering Services

**SPECIFICATIONS**

DIVISION 1 - GENERAL REQUIREMENTS

01 11 00            Scope of Contract  
01 73 00            Operation & Maintenance Manuals  
01 73 29            Cutting and Patching  
01 77 00            Project Close-Out Procedures  
01 78 39            Project As Built Documents

DIVISION 2 - EXISTING CONDITIONS

02 41 19            Selective Demolition

DIVISION 3 - CONCRETE

\*\*03 10 00          Concrete Forming and Accessories  
\*\*03 20 00          Concrete Reinforcing  
\*\*03 30 00          Cast-In-Place Concrete

DIVISION 4 - MASONRY

04 05 25            Masonry Accessories  
04 21 13            Brick Masonry

DIVISION 5 - METALS

05 50 00            Miscellaneous Metal Fabrications

DIVISION 6 - WOOD AND PLASTICS

06 10 00            Rough Carpentry

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07 11 14            Mastic Dampproofing  
07 13 28            Self-Adhering Membrane Veneer Wall Flashing  
07 16 16            Crystalline Waterproofing  
07 17 00            Bentonite Waterproofing  
07 60 00            Flashing and Sheet Metal

07 92 00            Joint Sealants

DIVISION 8 - DOORS AND WINDOWS

08 10 00            Steel Doors and Frames

DIVISION 9 - FINISHES

09 24 25            Stucco Soffits

09 91 13            Exterior Painting

DIVISION 14 - CONVEYING EQUIPMENT

14 24 24            Hydraulic Passenger Elevator

DIVISION 31        PILES

\*\*31 62 17         Steel Pin Piles

                    END  
                    KBJ-L&B Architects, LLC

**SECTION 01 11 00**

**SCOPE OF CONTRACT**

**PART 1 - GENERAL**

**1.1 GENERAL DESCRIPTION**

- A. Remove existing elevator equipment in Building E, provide deeper foundation and elevator pit, and install a new elevator at the Florida State College at Jacksonville, Kent Campus in accordance with these specifications, the accompanying drawings and under the administration of KBJ Architects, Inc.
- B. The objective of this project is to modify the existing elevator hoistway to accommodate a hydraulic elevator with a deeper pit. In order to accomplish this, the hoistway will be underpinned. The existing footing will be modified, soil will be excavated, and new footing and foundation walls will be constructed to required elevations. The masonry hoistway above will remain in place during this process.
- C. On completion, the hoistway shall be plumb to the specified tolerances and the masonry walls shall be free of cracks or faults. Any damage to existing construction caused by these operations shall be restored or repaired.

**1.2 CONTRACTOR'S SERVICES**

- A. Procure and pay for permits, utility connections, inspections, licenses, bonds, insurance, furnishing materials, products, labor, full time superintendence, tools, machinery, equipment, scaffolds, hoists, toilet facilities, transportation, services and incidentals necessary to such performance. Upon completion, all equipment, fixtures and devices shall be in operating condition with final connections of utilities made thereto, inspected and approved. The Elevator shall be in operating condition when turned over to the Owner.

**1.3 NOTICE OF COMMENCEMENT**

- A. As agent for the Owner prepare and sign a Notice of Commencement, file and post same as required by the Mechanics' Lien Law, Chapter 713, Florida Statutes. In addition to Florida State College at Jacksonville, name the Architect in the Notice to receive a copy of the Lienor's Notice as provided in

Florida Statutes Section 713.06 (2) (b).

**1.4 QUALITY CONTROL**

A. Contractor's Program:

1. Work in Progress: Contractor and subcontractors shall continuously monitor work, record deficiencies observed and initiate correction of unsatisfactory work.
2. Pre-Punch out: During finishing phase of project Contractor shall make frequent inspections with subcontractors and a representative of the Architect to progressively check for faulty work, record deficiencies observed and correct same.

**1.5 SAFETY PROCEDURES**

- A. This contract shall provide for the removal of existing materials scheduled for removal by a subcontractor that is licensed to remove and dispose in accordance with all governing laws and regulations.
- B. The Contractor shall be responsible for dust control, especially during demolition and the time period the existing construction is exposed prior to installation of new finish materials.
- C. The Contractor shall have an approved safety program in effect throughout the length of the contract.

**PART 2 - NOT USED**

**PART 3 - NOT USED**

END  
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**SECTION 01 73 00**

**OPERATION AND MAINTENANCE MANUALS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Prepare and furnish Operation and Maintenance Manuals for building operating systems, equipment, and for care, preservation and maintenance of products and finishes.
- B. O & M manuals requirements for products, finishes, equipment and building operating systems are included in appropriate sections of all Divisions included in this specification.
  - 1. Elevator system and equipment.
  - 2. Miscellaneous Project Records listed in Section 01 78 39.
  - 3. Mechanical System Manual: Specified in Division 15.
  - 4. Plumbing System Manuals: Specified in Division 15.
  - 5. Electrical Systems Manual: Specified in Division 16.
- C. O & M manuals shall be specially prepared for Owner and Owner's personnel. Manuals shall contain information necessary for safe and efficient operation and maintenance of building equipment and operating systems, and information relative to the inspection, maintenance and repair of building systems, products and finishes.
- D. O & M manuals shall include the information specified in specification sections, requiring the manual and include the following information as applicable:
  - 1. Table of Contents.
  - 2. Copies of applicable shop drawings and manufacturer's product data.
  - 3. System equipment identification, including name of manufacturer, model number and serial number of each component.

4. Operating, maintenance and repair instructions.
5. Emergency instructions.
6. Wiring diagrams.
7. Copies of Warranties/Guarantees and Service contracts.
8. Spare parts list.
9. Names and addresses of sources of maintenance parts, materials and service for each item.

**1.2 QUALITY ASSURANCE**

- A. Preparation: Shall be by personnel who are thoroughly trained and experienced in the operation and maintenance of the equipment or system involved.

**1.3 SUBMITTALS**

- A. Submit two complete sets of O & M manuals unless otherwise indicated.
- B. Submit prior to final payment.

**1.4 MANUALS**

- A. Binders: Commercial quality, for 8<sup>3</sup>/<sub>4</sub> x 11 inch paper, 3-ring vinyl covered loose-leaf binders, 2-inches to 3-inches in thickness as necessary to accommodate contents. Provide clear plastic sleeve on spine, for holding labels.
  1. Identify each binder on the front and spine with the printed title "O & M MANUAL", title of project, and subject matter covered in manual. Indicate volume number for multiple volume sets of manuals.
  2. Dividers: Heavy paper dividers with celluloid covered labeled tabs for each separate section. Clearly mark each tab to indicate section contents.
  3. Text Material: Use either manufacturer's standard printed material, or specially prepared data, neatly typewritten, on 8<sup>1</sup>/<sub>2</sub> x 11 inch, 20-pound white bond paper.
  4. Drawings: Provide reinforced punched binder tabs on drawings and bind in with text. Fold



oversize drawings to same size as text pages.

- B. Electronic: Complete Manual on Thumb drive or CD.

#### **1.5 MANUAL CONTENT**

- A. Organize contents of each manual into sections for each piece of related equipment. Each manual shall contain a title page, table of contents, copies of product data, supplemented by drawings and written text, as appropriate, and copies of any warranty, guarantee and service contract provided by manufacturer.
- B. Title Page: Enclosed in a transparent plastic envelope as first sheet of each manual. Provide following information
  - 1. Subject matter covered by manual.
  - 2. Name and address of project.
  - 3. Date of substantial completion.
  - 4. Name, address and telephone number of Contractor and equipment or product supplier.
  - 5. Cross-reference to related systems in other O & M manuals.
- C. Table of Contents: Provide one section in manuals for architectural products, including applied materials and finishes and a second section for products designed for moisture-protection and products exposed to weather.
  - 5. When manufacturer's standard printed product data is included in manuals, include only those sheets that are pertinent to specific part or product installed. Clearly mark each sheet to identify each part or product included in installation.
- E. When standard printed data is not available from manufacturer for operation and maintenance of equipment or systems, prepare typewritten text, to provide the necessary information.
- F. Prepare drawings when required to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams.

#### **1.6 MATERIALS AND FINISHES MAINTENANCE**

- A. Provide one section in manuals for architectural products, including applied materials and finishes, and a second section for products designed for moisture-protection and products exposed to weather.
- B. Provide complete manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.
- C. Provide complete manufacturer's data with instructions on the inspection, maintenance and repair of roofing, sealants and other products exposed to weather and for moisture-protection.

**1.7 EQUIPMENT AND SYSTEMS MAINTENANCE**

- A. Provide O & M manuals for each unit of equipment, each operating system, and each electric and electronic system, as appropriate. Refer to specification section where equipment is specified for additional requirements for providing operation and maintenance data for various equipment and operating systems.

**1.8 INSTRUCTION TO OWNER'S PERSONNEL**

- A. Prior to final inspection, instruct Owner's designated operating personnel in the operation, adjustment and maintenance of products, equipment and systems. Provide instruction at mutually agreed upon time.

**PART 2 - NOT USED**

**PART 3 - NOT USED**

END

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**SECTION 01 73 29**  
**CUTTING AND PATCHING**

**PART 1 - GENERAL**

**1.1 STRUCTURAL MEMBERS**

- A. Do not cut and patch in a manner which will result in reduction of load carrying capacity or load deflection ratio; submit proposal to Architect for review before proceeding.

**1.2 OPERATIONAL ELEMENTS AND SAFETY RELATED COMPONENTS**

- A. Do not cut and patch in a manner which will result in reduction of capacities to perform, decrease operational life, decrease safety or increase maintenance.

**1.3 WORK EXPOSED TO VIEW**

- A. Do not cut and patch in a manner which will result in reduction of visual quality or reveal substantial evidence of such work, both as judged by Architect. Remove work judged by Architect to be visually unacceptable or otherwise objectionable and replace with acceptable quality work.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Utilize materials which will match and result in equal or better quality than work being cut and patched in terms of performance characteristics and visual effect (where applicable).
- B. Where feasible, use products identical with the original.

**PART 3 - EXECUTION**

**3.1 TEMPORARY SUPPORT AND PROTECTION**

- A. Where work is to be cut, provide adequate temporary support to prevent failure or endangering other work. During operations provide and maintain adequate protection to prevent damage to other work, including exposure to adverse weather conditions.

**3.2 WORKMANSHIP**

- A. When work in place has been cut it shall be patched and finished by mechanics in such manner that the quality of workmanship and finish shall be compatible with that of adjacent work.

### **3.3 PROCEDURES**

- A. Cutting: Cut using methods least likely to damage adjacent work which will remain. Core drill holes in concrete. Cut using preferably sawing and grinding tools (rather than hammering or chipping).
- B. Patching: At patches make seams as durable and invisible as possible. Inspect patches and test to demonstrate integrity of work.
- C. Finishing: Restore finishes to exposed patches and extend onto adjoining areas in a manner to eliminate evidence of patching. Where patch occurs in a smooth painted surface, after application of primer and base coats extend final paint coat over entire unbroken surface containing patch.

END

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**SECTION 01 77 00**

**PROJECT CLOSE-OUT PROCEDURES**

**PART 1 - GENERAL**

**1.1 DEFINITION**

- A. Close-out is the series of actions required by the Contractor near the end of the Contract period, preparatory to termination of contract, acceptance by Architect, occupancy and similar actions evidencing completion of work and resulting in final payment.
- B. It is the Owner's intent for the General Contractor to "construction clean" the entire facility prior to substantial completion and the architectural punch list.
- C. Related Sections:
  - 1. Section 01 78 39 - PROJECT AS-BUILT DOCUMENTS.
  - 2. Section 01 73 00 - OPERATION AND MAINTENANCE MANUALS.
- D. This section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Inspection procedure.
  - 2. Warranties.
  - 3. Final cleaning.

**1.2 PUNCH LIST**

- A. Contractor shall submit in writing that all punch list items have been completed.

**1.3 BONDS AND SERVICE AGREEMENTS**

- A. As specified in various trade sections.

**1.4 PHYSICAL PROPERTY**

- A. Keys to locks, extra stocks, spare parts, special tools and the like.

**1.5 RELEASES**

- A. Operating certificates, such as Drainage Facility Certificate, and similar releases, entitling Owner to full and unrestricted use of the work and access to services and utilities.

#### **1.6 WARRANTIES**

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.
  - 1. Electronic Submission: Submit electronic copy of each warranty.
  - 2. Binder Submission:
    - a. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-inch by 11-inch paper.
    - b. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
    - c. Identify each binder on the front and spine with the typed or printed title "WARRANTIES", Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

#### **1.7 FINAL CLEANING**

- A. Upon completion of construction clean finish surfaces as follows:
  - 1. Pavements: Sweep with broom to remove loose rock, dirt and construction debris and wash with water running from a hose to remove cement stain and other discoloration.

FSCJ Kent Campus Building E Elevator  
0170

2. Aluminum: Wash with mild solution of non-alkali soap or detergent and remove smudges, pencil marks, gypsum board compound and other foreign matter, followed by clean water rinse.
3. Brick: Refer to Section 04 21 00 - BRICK MASONRY for cleaning procedures.

**PART 2 - NOT USED**

**PART 3 - NOT USED**

END  
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**SECTION 01 78 39**

**PROJECT AS-BUILT DOCUMENTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Contractor shall prepare and maintain As-built Documents recording work as actually performed. As-built Documents shall show all changes and deviations in work in relation to way in which it was shown and specified by original Contract Documents. Include all additional information not indicated by original Contract Documents. As-built Documents include contract drawings, shop drawings, specifications, addenda and change orders, product data submittals, samples, field records for variable and concealed conditions such as excavations and foundations, and miscellaneous project record information on work not shown, or shown schematically.
- B. As-built Documents shall be maintained on a black line copy of the Contract Drawings and one set of Specifications.
- C. The Contractor shall certify that the As-built Documents are correct and that all requirements specified in this section and in other sections of the specifications and in other contract documents are included. Contractor shall affix to the Documents a statement certifying the information in the As-built Document to be correct and a signature line. Contractor shall personally sign each As-built Document. Signature stamp is not acceptable.

**1.2 RECORD SAMPLES**

- A. At Substantial Completion, Architect and Owner will notify Contractor if any of samples submitted during progress of work are to be transmitted to Owner for record purposes. Comply with Architect-Engineer's instructions for packaging, identification marking and delivery to Owner's sample storage space. Dispose of samples not transmitted to Owner.

**1.3 MISCELLANEOUS PROJECT RECORDS**

- A. Refer to other sections of these specifications for requirements of miscellaneous record-keeping and submittals. Immediately prior to Substantial Completion, complete miscellaneous Project Records

and place in good order, properly identified and bound in 3-ring binders. Include the following:

1. Field records on demolition and similar work.
2. Test reports for compliance with Contract Documents.
3. Certifications received from Contractor for compliance with Contract Documents.
4. Field testing reports.
5. Load and performance testing.
6. Inspections and certifications by governing authorities.

**1.4 SUBMITTAL**

A. Submit all As-built Documents at one time to Architect for review and transmittal to Owner. Final payment will be withheld until Record Documents are submitted and accepted by the Owner.

**PART 2 - NOT USED**

**PART 3 - NOT USED**

END  
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**SECTION 02 41 19**

**SELECTIVE DEMOLITION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section requires the selective removal of the listed items and subsequent off-site disposal of portions of existing building as indicated on drawings and as required to accommodate new replacement construction.
  - 1. Demolition and removal of elevator equipment.
  - 2. Demolition and renovation of existing hoistway foundation and temporary support of hoistway.
  - 3. Demolition and removal of indicated portions of existing stucco soffits.

**1.2 SUBMITTALS**

- A. Schedule indicating proposed sequence of operations for selective demolition work to Owner's Representative for review prior to start of work. Include coordination of shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
  - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
  - 2. Coordinate with Owner's continuing occupation of existing buildings.
- B. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative prior to start of work.

**1.3 JOB CONDITIONS**

- A. Occupancy: Owner will occupy all buildings immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Demolition activities

that will affect Owner's normal operations shall be completed on weekends, holidays or school breaks as approved by the Owner.

B. Condition of Structures:

1. Owner assumes no responsibility for actual condition of items or structures to be demolished.
2. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.

C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed. Storage or sale of removed items on site will not be permitted.

D. Protections:

1. Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
2. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
3. Erect temporary covered passageways as required by authorities having jurisdiction.
4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
5. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building. Remove protections at completion of work.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.

F. Traffic:

1. Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.
2. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.

H. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
2. Maintain fire protection services during selective demolition operations.

I. Environmental Controls:

1. Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
2. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

**PART 2 - NOT USED**

**PART 3 - EXECUTION**

**3.1 DEMOLITION**

- A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations. Maintain all buildings in a watertight condition.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

**3.2 DISPOSAL OF DEMOLISHED MATERIALS**

- A. Remove from building site all debris, rubbish and other materials resulting from demolition operations. Transport and legally dispose of off-site.
  - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
  - 2. Burning of removed materials is not permitted on project site.

**3.3 CLEANUP AND REPAIR**

- A. General:
  - 1. Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
  - 2. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END  
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**SECTION 03 10 00**

**CONCRETE FORMING AND ACCESSORIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Form-facing material for cast-in-place concrete.
2. Shoring, bracing, and anchoring.

**1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.3 ACTION SUBMITTALS**

A. Product Data: For each of the following:

1. Exposed surface form-facing material.
2. Concealed surface form-facing material.
3. Form ties.
4. Waterstops.
5. Form-release agent.

- B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301 (ACI 301M).
  - a. Location of construction joints is subject to approval of the Architect.
3. Indicate location of waterstops.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Field quality-control reports.
- B. Minutes of preinstallation conference.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORMANCE REQUIREMENTS**

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
  - 1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
  - 2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

#### **2.2 FORM-FACING MATERIALS**

- A. As-Cast Surface Form-Facing Material:
  - 1. Provide continuous, true, and smooth concrete surfaces.
  - 2. Furnish in largest practicable sizes to minimize number of joints.
  - 3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
    - a. Plywood, metal, or other approved panel materials.
    - b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      - 1) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.



- 2) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
- 3) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

### **2.3 WATERSTOPS**

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

### **2.4 RELATED MATERIALS**

A. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Form release agent for form liners shall be acceptable to form liner manufacturer.

B. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

**PART 3 - EXECUTION**

**3.1 INSTALLATION OF FORMWORK**

- A. Comply with ACI 301 (ACI 301M).
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M) and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes
- C. Limit concrete surface irregularities as follows:
  - 1. Surface Finish-2.0: ACI 117 Class B, 1/4 inch (6 mm).
- D. Construct forms tight enough to prevent loss of concrete mortar.
  - 1. Minimize joints.
  - 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
  - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
  - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
  - 1. Provide and secure units to support screed strips.
  - 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
  - 1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
  - 2. Locate temporary openings in forms at inconspicuous locations.

- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches (305 mm).
- K. Form openings, chases, offsets, sinkages, keyways, blocking, screeds, and bulkheads required in the Work.
  - 1. Determine sizes and locations from trades providing such items.
  - 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
  - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
  - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 3. Place joints perpendicular to main reinforcement.
  - 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
    - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
  - 1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  - 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### **3.2 INSTALLATION OF EMBEDDED ITEMS**

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
  - 3. Clean embedded items immediate prior to concrete placement.

### **3.3 INSTALLATION OF WATERSTOPS**

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.
  - 1. Install in longest lengths practicable.
  - 2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
  - 3. Protect exposed waterstops during progress of the Work.

### **3.4 SHORING AND RESHORING INSTALLATION**

- A. Comply with ACI 318 (ACI 318M) and ACI 301 (ACI 301M) for design, installation, and removal of shoring and reshoring.
  - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

### **3.5 FIELD QUALITY CONTROL**

- A. Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  - 1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
  - 2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END



**SECTION 03 20 00**  
**CONCRETE REINFORCING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Steel reinforcement bars.
  - 2. Welded-wire reinforcement.

**1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For the following:
  - 1. Each type of steel reinforcement.
  - 2. Bar supports.
- B. Shop Drawings: Comply with ACI SP-066:
  - 1. Include placing drawings that detail fabrication, bending, and placement.
  - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
  - 1. Location of construction joints is subject to approval of the Architect.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.

1. Reinforcement to Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M
- B. Material Test Reports: For the following, from a qualified testing agency:
  1. Steel Reinforcement:
    - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
  2. Mechanical splice couplers.
- C. Field quality-control reports.
- D. Minutes of preinstallation conference.

## **1.5 QUALITY ASSURANCE**

- A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

## **PART 2 - PRODUCTS**

### **2.1 STEEL REINFORCEMENT**

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

### **2.2 REINFORCEMENT ACCESSORIES**

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
  1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of



Standard Practice," of greater compressive strength than concrete and as follows:

- a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- B. Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.
  1. Finish: Plain.

### **2.3 FABRICATING REINFORCEMENT**

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Protection of In-Place Conditions:
  1. Do not cut or puncture vapor retarder.
  2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### **3.2 INSTALLATION OF STEEL REINFORCEMENT**

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
  1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
  2. Do not tack weld crossing reinforcing bars.

- C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
  - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
  - 2. Stagger splices in accordance with ACI 318 (ACI 318M).
  - 3. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.
- G. Install welded-wire reinforcement in longest practicable lengths.
  - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
    - a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches (305 mm).
  - 2. Lap edges and ends of adjoining sheets at least one mesh spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
  - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
  - 4. Lace overlaps with wire.

### **3.3 JOINTS**

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement.
  - 2. Continue reinforcement across construction joints unless otherwise indicated.
  - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.

**3.4 INSTALLATION TOLERANCES**

- A. Comply with ACI 117 (ACI 117M).

**3.5 FIELD QUALITY CONTROL**

- A. Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  - 1. Steel-reinforcement placement.

END



**SECTION 03 30 00**

**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

**1.2 DEFINITIONS**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

**1.3 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each of the following.
1. Portland cement.
  2. Fly ash.

3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.
6. Admixtures:
  - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
7. Liquid floor treatments.
8. Curing materials.
9. Joint fillers.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
  2. Admixtures.
  3. Curing compounds.
  4. Joint-filler strips.
- B. Material Test Reports: For the following, from a qualified testing agency:
1. Portland cement.
  2. Fly ash.
  3. Slag cement.
  4. Blended hydraulic cement.
  5. Aggregates.
  6. Admixtures:
- C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
- D. Preconstruction Test Reports: For each mix design.
- E. Field quality-control reports.
- F. Minutes of preinstallation conference.

#### **1.6 QUALITY ASSURANCE**

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

### **1.7 PRECONSTRUCTION TESTING**

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

- a. Admixture dosage rates.
- b. Slump.
- c. Air content.
- d. Seven-day compressive strength.
- e. 28-day compressive strength.

### **1.8 DELIVERY, STORAGE, AND HANDLING**

A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

### **1.9 FIELD CONDITIONS**

A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M).

## **PART 2 - PRODUCTS**

### **2.1 CONCRETE, GENERAL**

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117.
3. ACI MNL-15(16) Field Reference Manual.

### **2.2 CONCRETE MATERIALS**

A. Cementitious Materials:



1. Portland Cement: ASTM C150/C150M, Type I, Type II, Type I/II gray.
  2. Fly Ash: ASTM C618, Class C or F.
  3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
  4. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, Portland blast-furnace slag, Type IP, Portland-pozzolan, Type IL, Portland-limestone or Type IT, ternary blended cement.
- B. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.
1. Alkali-Silica Reaction: Comply with one of the following:
    - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
    - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
    - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. (2.37 kg/cu. m) for moderately reactive aggregate or 3 lb./cu. yd. (1.78 kg/cu. m) for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301 (ACI 301M).
  2. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
  3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  2. Retarding Admixture: ASTM C494/C494M, Type B.

3. Water-Reducing and -Retarding Admixture:  
ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M,  
Type F.
5. High-Range, Water-Reducing and -Retarding Admixture:  
ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture:  
ASTM C1017/C1017M, Type II.
7. Crystalline Waterproofing Admixture: Manufactured by  
Xypex Chemical or approved equal.

E. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

### **2.3 LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

### **2.4 CURING MATERIALS**

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
  1. Color:
    - a. Ambient Temperature Below 50 deg F (10 deg C): Black.
    - b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
    - c. Ambient Temperature Above 85 deg F (29 deg C): White.
- C. Curing Paper: Eight-foot- (2438-mm-) wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- D. Water: Potable or complying with ASTM C1602/C1602M.
- E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

- F. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

## **2.5 RELATED MATERIALS**

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Floor Slab Protective Covering: Eight-feet- (2438-mm-) wide cellulose fabric.

## **2.6 CONCRETE MIXTURES, GENERAL**

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
  - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
  - 2. Slag Cement: 50 percent by mass.
  - 3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
  - 4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
  - 1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50.
4. Use crystalline waterproofing admixture in elevator pit and wall concrete at dosage rate in accordance with manufacturer's recommendations.

## 2.7 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings and mats.

1. Exposure Class: ACI 318 (ACI 318M) F1, S0, P0, C1.
2. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
3. Maximum w/cm: 0.60.
4. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm), 8 inches (200 mm), plus or minus 1 inch (25 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
  - a. Exposure Class F1: 1.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch (38-mm) nominal maximum aggregate size.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

B. Class B: Normal-weight concrete used for foundation walls.

1. Exposure Class: ACI 318 (ACI 318M) F1, S0, P0, C1.
2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
3. Maximum w/cm: 0.56.
4. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm), 8 inches (200 mm), plus or minus 1 inch (25 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:

- a. Exposure Class F1: 1.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch (38-mm) nominal maximum aggregate size.
  6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- C. Class C: Normal-weight concrete used for slabs-on-ground.
1. Exposure Class: ACI 318 (ACI 318M) F1, S0, P0, C1.
  2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  3. Maximum w/cm: 0.56.
  4. Minimum Cementitious Materials Content: 470 lb./cu. yd. (279 kg/cu. m).
  5. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm), 8 inches (200 mm), plus or minus 1 inch (25 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture at Project Site.
  6. Air Content:
    - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
  7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Class D: Normal-weight concrete used for suspended slabs.
1. Exposure Class: ACI 318 (ACI 318M) F1, S0, P0, C1.
  2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  3. Maximum w/cm: 0.56.
  4. Minimum Cementitious Materials Content: 470 lb./cu. yd. (279 kg/cu. m).
  5. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm), 8 inches (200 mm), plus or minus 1 inch (25 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture Project site.
  6. Air Content:
    - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

## **2.8 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
  2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
  3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF EMBEDDED ITEMS**

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
  1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
  3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

### 3.2 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  - 2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 6. Space vertical joints in walls as indicated on Drawings.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

### **3.3 CONCRETE PLACEMENT**

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.



1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
  2. Deposit concrete to avoid segregation.
  3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
  2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  3. Maintain reinforcement in position on chairs during concrete placement.
  4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  5. Level concrete, cut high areas, and fill low areas.
  6. Slope surfaces uniformly to drains where required.

7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

### **3.4 FINISHING FORMED SURFACES**

#### **A. As-Cast Surface Finishes:**

1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than 1-1/2 inches (38 mm) wide or 1/2 inch (13 mm) deep.
  - b. Remove projections larger than 1 inch (25 mm).
  - c. Tie holes do not require patching.
  - d. Surface Tolerance: ACI 117 (ACI 117M) Class D.
  - e. Apply to concrete surfaces not exposed to public view.
2. ACI 301 (ACI 301M) Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
  - b. Remove projections larger than 1/4 inch (6 mm).
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 (ACI 117M) Class B.
  - e. Locations: Apply to concrete surfaces exposed to public view, or to be covered with a coating or covering material applied directly to concrete.

#### **B. Related Unformed Surfaces:**

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.5 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
  
- B. Float Finish:
  - 1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
  - 2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.
  - 3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing.
  
- C. Trowel Finish:
  - 1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
  - 2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
  - 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 4. Do not add water to concrete surface.
  - 5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
  - 6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 7. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).
  
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
  2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  2. Coordinate required final finish with Architect before application.

### **3.6 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS**

- A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
  2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
  3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

### **3.7 CONCRETE CURING**

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
  2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h (1 kg/sq. m x h) before and during finishing

operations. Apply in accordance with manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.

D. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
  - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

- 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12-inches (300-mm).
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.
    - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - b) Cure for not less than seven days.
  - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
    - a) Water.
    - b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
- 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining

cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.

- a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
  - b) Cure for not less than seven days.
- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
- a) Water.
  - b) Continuous water-fog spray.

c. Floors to Receive Urethane Flooring:

- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
- 2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches (150 mm) and sealed in place.
- 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
- 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

d. Floors to Receive Curing Compound:

- 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Maintain continuity of coating, and repair damage during curing period.
- 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless

manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

### **3.8 TOLERANCES**

- A. Conform to ACI 117 (ACI 117M).

### **3.9 APPLICATION OF LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.
  - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  - 2. Do not apply to concrete that is less than **28** days' old.
  - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
  - 4. Rinse with water; remove excess material until surface is dry.
  - 5. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

### **3.10 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
  - 1. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.



2. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

- 1) Project name.
- 2) Name of testing agency.
- 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
- 4) Name of concrete manufacturer.
- 5) Date and time of inspection, sampling, and field testing.
- 6) Date and time of concrete placement.
- 7) Location in Work of concrete represented by samples.
- 8) Date and time sample was obtained.
- 9) Truck and batch ticket numbers.
- 10) Design compressive strength at 28 days.
- 11) Concrete mixture designation, proportions, and materials.
- 12) Field test results.
- 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
- 14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.

4. Curing procedures and maintenance of curing temperature.
  5. Verification of concrete strength before removal of shores and forms from beams and slabs.
  6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
    - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C143/C143M:
    - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    - b. Perform additional tests when concrete consistency appears to change.
  3. Slump Flow: ASTM C1611/C1611M:
    - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    - b. Perform additional tests when concrete consistency appears to change.
  4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
    - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  5. Concrete Temperature: ASTM C1064/C1064M:

- a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C31/C31M:
  - a. Cast and laboratory cure two sets of four 6-inch (150 mm) by 12-inch (300 mm) cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M.
  - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
  - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

- a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
  - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
    - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

### **3.11 PROTECTION**

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
  2. Diaper hydraulic equipment used over concrete surfaces.
  3. Prohibit vehicles from interior concrete slabs.
  4. Prohibit use of pipe-cutting machinery over concrete surfaces.
  5. Prohibit placement of steel items on concrete surfaces.
  6. Prohibit use of acids or acidic detergents over concrete surfaces.
  7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
  8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END

**SECTION 04 05 25**

**MASONRY ACCESSORIES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide masonry accessories shown on the drawings, specified and required for wall types indicated.

**1.2 RELATED WORK**

- A. Section 04 21 13 - BRICK MASONRY.

**1.3 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- |    |                   |  |
|----|-------------------|--|
| 1. | ASTM A 82         | Steel Wire, Plain, for<br>Concrete Reinforcement       |
| 2. | ASTM A 153/A 153M | Zinc Coating (Hot-Dip) on<br>Iron and Steel Hardware   |
| 3. | ASTM A 641/a 641M | Zinc-Coated (Galvanized)<br>Carbon Steel Wire          |
| 4. | ASTM A 924/A 924M | Steel Sheet, Metallic-Coated<br>by the Hot-Dip Process |

**1.4 SUBMITTALS**

- A. Product Data: Submit product data and installation instructions for each masonry accessory required. Data shall show thickness, gage and galvanized coating for each type accessory.

- B. Samples:

- 1. Submit one sample of each accessory required.
- 2. Identify each sample with Architect's Commission No. and Project Title.

**1.4 PRODUCT HANDLING**

- A. Store accessories indoors and protect from damage.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Fabricate wire accessories from cold drawn steel wire conforming to ASTM A 82, zinc coated in accordance with ASTM A 641/A 641M, Class 2.
- B. Fabricate sheet steel accessories from sheet steel conforming to ASTM A 924/A 924M, zinc coated in accordance with ASTM A 153/A 153M, Class B2.

### **2.2 MANUFACTURERS**

- A. The following manufacturers are acceptable provided the products furnished are equal in gage, thickness, strength and performance to the products specified:
  - 1. Dur-O-Wal Inc.
  - 2. Heckman Building Products Co.
  - 3. Hohmann & Barnard, Inc.
- B. Products of Dur-O-Wal, Inc. are specified to establish the basic type, design, minimum thickness, gage and size required. Approved equivalent products of other acceptable manufacturers may be furnished provided products are equal in type and design and meet requirements specified.

### **2.3 FINISH**

- A. All accessories shall be hot dip galvanized in accordance with ASTM A 153/A 153M, Class B-2, 1.5 ounce psf.

### **2.4 HORIZONTAL JOINT REINFORCING (HJR)**

- A. Provide HJR fabricated of  $\frac{3}{16}$ -inch deformed wire side rods and 9-gage plain cross rods flush welded to side rods. HJR may be ladder type with perpendicular cross rods welded at 15-inches on center, or truss type with diagonal cross rods welded at 16 inches on center. Provide in 10-foot straight lengths with matching L-shaped corner pieces and T-shaped intersection pieces. Width shall be  $1\frac{1}{2}$ -inches less than actual width of wall or partition or 2-inches less than nominal width of wall or partition. Single side rods and ladder or truss cross rods. Dur-O-Wal D/A320 Ladur or Dur-O-

Wall D/A310 Truss.

## **2.5 CAVITY MORTAR SCREEN**

- A. Provide a trapezoidal shaped, thermally bonded UV stable fiber mesh for use in the masonry cavity to keep weep vents and flashings free from mortar droppings.
- B. Provide thickness to fill cavity opening
  - 1. Approved: Hohmann & Barnard; Mortar Trap, or DUR-O-WALL; Mortar Net NA 1008.

## **2.6 WEEP HOLE VENT**

- A. Provide weep hole honeycomb designed ventilators as detailed at the brick cavity walls. Ventilator shall be manufactured from flexible ultra violet resistant polypropylene co-polymer.
- B. Provide size to fill jumbo brick joints.
  - 1. Approved: DUR-O-WALL, Cell Vent or Hohmann & Barnard QV Quadro-Vent

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. All anchors, ties and reinforcing shall be solidly embedded in mortar. Anchors, ties and reinforcing shall be carefully positioned in the outer wythe so that the metal is covered with no less than ½-inch thickness of mortar.

### **3.2 ANCHORAGE TO CMU**

- A. Locate Masonry Veneer Anchors at not more than 16-inches apart vertically and not more than 24-inches apart horizontally.
- B. Attach Masonry Veneer Anchors to CMU or concrete using Tapcon anchors.

### **3.3 MORTAR SCREENS**

- A. Install at all horizontal masonry supports including shelf angles. Apply in conjunction with weep vents.

### **3.4 WEEP VENTS**

- A. Install at head joints, spaced 2 feet o.c. as

indicated on drawing.

**3.5 HORIZONTAL JOINT REINFORCING (HJR)**

- A. Install the type indicated or specified in all masonry walls and partitions continuous at 16-inches on centers vertically starting 16-inches above footing or slab and ending with the last mortar joint. In addition, install reinforcing in the first two mortar joints above and below all openings, extending at least 24-inches beyond each side of the opening. Install so that a cross rod or box tie occurs within 4-inches of all openings. Lap all joints not less than 6-inches.

END

KBJ-L&B Architects, LLC



**SECTION 04 21 13**

**BRICK MASONRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide brick masonry work to match existing specified and shown on the drawings.
- B. Provide mortar as specified herein.
- C. Clean new and existing brick as specified and as shown on Drawings.

**1.2 RELATED WORK**

- A. Masonry Accessories: Anchors, ties and reinforcement are specified in Section 04 05 23 - MASONRY ACCESSORIES.

**1.3 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- 1. ASTM C 62 Building Brick (Solid Masonry Units Made from Clay or Shale)
- 2. ASTM C 67 Sampling and Testing Brick and Structural Clay Tile
- 3. ASTM C 91 Masonry Cement
- 4. ASTM C 144 Aggregate for Masonry Mortar
- 5. ASTM C 150 Portland Cement
- 6. ASTM C 207 Hydrated Lime for Masonry Purposes
- 7. ASTM C 216 Facing Brick (Solid Masonry Units Made from Clay or Shale)
- 8. ASTM C 270 Mortar for Unit Masonry
- 9. ASTM C 780 Test Method for Preconstruction and Construction Evaluation of Mortar for Plain and Reinforced Unit

Masonry.

10. ASTM C 1314 Compressive Strength of Masonry  
Prisms

BRICK INDUSTRY ASSOCIATION (BIA)

1. Technical Notes on Brick Construction

**1.4 QUALITY ASSURANCE**

- A. Brick Industry Association (BIA): Brick masonry work shall conform to the requirements and recommendations of Technical Notes on Brick Construction published by BIA.
- B. Mason shall have a minimum of 10 years experience in brick construction.
- C. Field Sample: Prior to commencing masonry work, erect sample wall panel on the site using brick, mortar, bond and joint tooling for approval by the Architect. Build sample approximately 4 ft. x 4 ft., indicating proposed range of color, texture joints and workmanship. Retain sample during construction as a standard for judging completed work. Remove when work is completed. Use sample panel(s) to test proposed cleaning procedures.
- D. Testing: contractor shall employ and pay an experienced independent testing laboratory to make, transport, and perform the specified tests. Test reports shall be submitted to the Architect within 3 days of completion of each test.
  - 1. Masonry Prism Test:
    - a. Perform compressive masonry strength test as determined by testing compressive prisms in accordance with ASTM C 1314.
    - b. Results of prism test shall be submitted at 7 and 28 days.
    - c. The prism shall achieve a minimum of 1,000 psi at 28 days.
    - d. Masonry Prisms shall be tested for each 10,000 square feet of masonry work.
  - 2. Mortar Aggregate Ratio Test:
    - a. Mortar Tests: Verify by testing in accordance with ASTM C 780, Annex A4.

Verify that mortar being mixed and applied to masonry contains water/cement and aggregate cement ratios in accordance with these specifications.

- b. Make and test a minimum of 3 samples of mortar before construction and 3 samples per 10,000 sf of brick veneer wall during construction.

#### **1.5 SUBMITTALS**

- A. Manufacturer's Product Data: Submit data for each type brick required. Include instructions for handling, storage, installation and protection.
- B. Certification: Submit for each type brick, certification by manufacturer that brick conforms to ASTM Specifications.
- C. Submit results of tests for initial rate of absorption and compressive strength in accordance with ASTM C 67, by an independent laboratory, for each type brick required.
- D. Brick Samples: Submit five-brick bound sample of each type face brick required showing full range of color and texture to be expected in the completed work.
- E. Colored Mortar: Submit samples for color selection.

#### **1.6 JOB CONDITIONS**

- A. Protection: Store brick and mortar materials off ground and under cover and keep dry. Protect brick from staining.
- B. During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed walls when work is not in progress. Extend cover a minimum of 24-inches down both sides of wall and anchor cover securely in place.
- C. Protect walls, sills, ledges and projections from mortar droppings.
- D. Cold Weather Protection: Conform to BIA Technical Notes 1 and 1A.

### **PART 2 - PRODUCTS**

**2.1 FACING BRICK**

- A. Manufacturer: Taylor Clay Products, Salisbury, NC.; Auburn Ironspot Utility Brick.
  - 1. Blend Percentages: #3-5 60%, #3-7 25% and #3-9 15%
- B. Size: 3 5/8"W x 3 5/8"H x 11 5/8"L.
- C. Conform to ASTM C 216, Grade SW, Type FBS.

**2.2 MORTAR**

- A. Materials:
  - 1. Portland Cement: ASTM C 150, Type I.
  - 2. Hydrated Lime: ASTM C 207, Type S.
  - 3. Aggregates: ASTM C 144, clean, sharp, natural or manufactured sand.
  - 4. Water: Clean and potable, free from deleterious materials.

**2.3 CEMENT-LIME MORTAR**

- A. Conform to ASTM C 270, Type S Mortar, 1,800 psi at 28 days. Proportion by volume with aggregate in damp, loose and measure.
- B. Cement-Lime Mortar Mix.
  - 1. Portland Cement: one part.
  - 2. Aggregate: Not less than 2 1/4 and not more than 3 1/2 parts.
  - 3. Lime: Not more than 50% of cement volume.

**2.4 MASONRY CEMENT**

- A. Masonry cements formulated to produce mortar conforming to ASTM C 91, for all brick masonry not otherwise indicated. Type S for use in preparation of ASTM C 270 Type S Mortar, 1,800 psi at 28 days. with 12% maximum air content and 19% air entrainment for exterior use by volume, non-staining type and requiring only the addition of water and aggregate. Proportion by volume with aggregate in damp, loose sand measure in accordance with manufacturer's directions. Manufacturer: Lehigh or approved equivalent.

B. Masonry Cement Mortar:

1. Masonry Cement: One part.  
Aggregate: Not less than 2½ and not more than 3 parts. (Blended Sand)

**2.5 MORTAR MIXES**

A. Do not lower the freezing point of mortar by use of admixtures or anti-freeze agents.

B. Do not use calcium chloride in mortar.

C. Mixing Mortar:

1. Do not use shovels for measuring mortar materials.
2. Use a measuring container of a calculated volume in cubic feet of the cement to place all materials in mixer.
3. Thoroughly machine mix for a period of not less than 3 minutes and not more than 5 minutes after all materials are in the mixer.

**2.6 MORTAR COLOR**

A. Manufacturer: Custom Match Mortar Pigment Company, Salisbury, NC. Complying with ASTM C 979.

1. Match existing mortar color.
2. Mix Ratio: One bag of pigment, one bag of masonry cement with 3 parts sand.

**2.7 FLASHING**

A. Flashing as specified in Section 07 60 00 - FLASHING AND SHEET METAL.

**2.8 CLEANING MATERIALS**

A. Manufacturer: Sure Klean Products as manufactured by ProSoCo, Inc.

1. Clay Masonry Cleaner 600 - new brick.
1. Enviro Klean Restoration Cleaner - existing brick.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Wet clay brick having initial rates of absorption (ASTM C 67) exceeding 0.030 grams per minute per 30 square inches. Use wetting methods which insure that each brick is nearly saturated but surface dry when laid.

### **3.2 INSTALLATION**

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, expansion and control joints, returns and offsets. Do not use units less than half size at corners and jambs.
- B. Build walls, and other brick construction to the thickness shown. Build single-wythe walls to the actual thickness of brick units.
- C. Cut brick units using power-driven masonry saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly.
- D. Match existing masonry work including mortar, coursing, bond, color and texture.

### **3.3 LAYING WALLS**

- A. Lay up walls plumb and true, with courses level, to comply with construction tolerances specified in BIA Technical Note 11D. Accurately space and coordinate with other work.
- B. Bond Pattern: Lay brick in bond pattern to match existing. Lay concealed brick with all units in a wythe in running bond or bonded by lapping not less than 2-inches. Bond and interlock each course of each wythe at corners.
- C. Lay brick with completely filled bed and head joints except at head joints for weeps; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.
- D. Joints to be concealed or to be covered by other materials shall be cut flush.
- E. Brick disturbed after laying shall be removed, cleaned and rest in fresh mortar. If adjustments are required, remove brick, clean off mortar and reset in fresh mortar.
- F. Stopping and Resuming Work: Rack back half-unit

length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly, if required, and remove loose masonry units and mortar prior to laying fresh masonry.

- G. Built-In Work: As the work progresses, build-in items indicated and specified. Fill in solidly with masonry around built-in items. Fill space between hollow metal frames and masonry solidly with mortar.
- H. Anchors, Ties and Joint Reinforcement: Refer to Section 04 05 23 - MASONRY ACCESSORIES for type and installation.
- I. Cavity Walls: Keep cavity clean of mortar droppings and other materials during construction. Strike joints facing cavity flush.
- J. Weep Holes:
  - 1. Provide weep-holes in exterior wythe of cavity walls and brick veneer located in head joint immediately above grade lintels, shelf angles, and flashing, spaced 24-inches o.c., unless otherwise indicated.
  - 2. Provide in other locations indicated.
- K. Control and Expansion Joints: Provide vertical expansion, control and isolation joints in masonry where shown. Build-in as the masonry work progresses. Build flanges of metal expansion strips and factory-fabricated expansion joint units into masonry. Lap each joint 4-inches in direction of low. Seal joints below grade and at junctures with horizontal expansion joints.
- L. Shelf Angles: Shelf angles are not to be secured until the last course of masonry under shelf angle has been laid. Install 2-inch wide strips of sealing tape on top of masonry under angles.

#### **3.4 REPAIR AND POINTING**

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, and units that do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids and holes, except weep-holes, and completely fill with mortar. Point up all joints including corners,

openings and adjacent works to provide a neat, uniform appearance, properly prepared for application of sealant.

### **3.5 CLEANING**

- A. Wipe off excess mortar as work progresses. Dry brush at end of each day's work.
- B. Clean exposed brick with brick cleaner of a brand and mixture recommended by the brick manufacturer. Follow cleaner manufacturer's cleaning directions and as specified.
- C. Brick shall be washed off thoroughly with fresh, pressurized water, after application of cleaning solutions.
- D. Protect adjacent surfaces from damage from erosion by cleaner during cleaning and rinsing.
- E. Do not use wire brushes or other tools that will damage brick.
- F. Clean brick and joints of all mortar smears, fungi, stains, efflorescence and other superficial deposits.
- G. Repeat cleaning if necessary to eliminate the surface deposits.

### **3.6 PROTECTION**

- A. Protect masonry work from deterioration, discoloration or damage during subsequent construction operations. Normal weathering of masonry work, exposed to the weather after completion, will be acceptable, provided other conditions and activities do not interfere and result in an unacceptable condition.

END  
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**SECTION 05 50 00**

**MISCELLANEOUS METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide miscellaneous metal work shown on the drawings, specified herein and required to complete the work.
- B. Hot-Dip galvanize items as specified or indicated and all anchors and plates for embedment in concrete or masonry and miscellaneous steel as indicated.

**1.2 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

- 1. AISC ASD    Manual of Steel  
Construction latest  
edition

ASTM INTERNATIONAL (ASTM)

- 1. ASTM A 297/A 297M                          Steel Castings, Carbon,  
for General Application
- 2. ASTM A 36/A 36M                                  Carbon Structural Steel
- 3. ASTM A 108    Steel Bars, Carbon, Cold-  
Finished, Standard Quality
- 4. ASTM A 123/A 123M                          Zinc (Hot-Dipped  
Galvanized) Coatings on  
Iron and Steel Products
- 5. ASTM A 153/A 153M                          Zinc-Coated (Hot Dip) on  
Iron and Steel Hardware
- 6. ASTM A 572/A 572M                          Steel Plates
- 7. ASTM A 307    Carbon Steel Bolts and  
Studs. 60,000 psi Tensile  
Strength.

- |     |                   |   |
|-----|-------------------|---|
| 8.  | ASTM A 354        | Quenched and Tempered<br>Steel Bolts and Studs  |
| 9.  | ASTM A 653/A 653M | Steel Sheet, Zinc-Coated<br>(Galvanized) or Zinc-Iron<br>Alloy-Coated<br>(Galvannealed) by the Hot-<br>Dip Process) |
| 10. | ASTM A 924/A 924M | Steel Sheet, Metallic-<br>Coated by the Hot-Dip<br>Process  |

AMERICAN WELDING SOCIETY (AWS)

- |    |                |                                   |
|----|----------------|-----------------------------------|
| 1. | AWS D1.1/D1.1M | Structural Welding Code-<br>Steel |
|----|----------------|-----------------------------------|

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

- |    |                      |                          |
|----|----------------------|--------------------------|
| 1. | SSPC-SP 3            | Power Tool Cleaning      |
| 2. | SSPC-SP 7/NACE No. 4 | Brush-Off Blast Cleaning |

**1.3 QUALITY ASSURANCE**

- A. Field Measurements: Verify shop drawing dimensions by field measurements prior to fabrication.
- B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.
- C. Certification of Welders: Welding shall be done by welders who are currently qualified by test procedures in AWS D1.1/D1.1M, AWS D1.2, and AWS D1.3.

**1.4 SUBMITTALS**

- A. Manufacturer's Product Data: Submit for products to be used in fabrication of miscellaneous steel work, including shop primer and galvanized repair compound.
- B. Shop Drawings: Submit for each miscellaneous steel item. Include plans, elevations, details, sections and connections. Show anchorage and accessory items.
- C. Certificate of Qualification for field welders.

**PART 2 - PRODUCTS**

## **2.1 MATERIALS AND COMPONENTS**

- A. Metal Surfaces: For miscellaneous steel work which will be exposed to view, materials shall be smooth and free of surface blemishes including pitting, seam marks, rolled trade names and roughness.
- B. Steel Plates, Shapes and Bars: ASTM A 36/A 36M.
- C. Steel Plates to be Bent or Cold Formed: ASTM A 283/A 283M, Grade C.
- D. Steel Bars and Bar-Sized Shapes: ASTM A 663, Grade 65 or ASTM A 36/A 36M.
- F. Concrete Inserts: Cast steel, ASTM A 27/A 27M, expansion sleeves and steel bolts ASTM A 307, galvanized.
- G. Nonshrink Nonferrous Grout: Meadows Sealtight V-3, Sonneborn SonogROUT or Thoro Thoroset.

## **2.2 STEEL STRENGTH**

- A. All steel shapes shall have a minimum yield strength of 50,000 psi.

## **2.3 FASTENERS**

- A. General: Provide zinc-coated fasteners for all interior and exterior use. Select fasteners for the type, grade and class required.
- B. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A and ASTM A 563.
- C. Machine Screws: Alloy steel, galvanized ASTM A 574 and ASTM F 835.
- D. Plain Washers: Round, carbon steel, ASTM F 436.
- E. Expansion Anchorage Devices: Type and size as required and approved for intended use.
- F. Toggle Bolts: Tumble-wing type, class and style as required and approved for intended use.
- G. Lock Washers: Helical spring type carbon steel.

## **2.4 ROUGH HARDWARE**

- A. Furnish standard and custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel shapes as required for framing

and supporting steel work, and for anchoring or securing steel to concrete or other structures.

- B. Manufacture or fabricate rough hardware items of sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

## **2.5 SHOP PRIMER**

- A. Provide a universal primer as recommended by the manufacturer for the type metal being primed. Coordinate selection of metal primer with finish paint requirements specified in Section 09900 - PAINTING. Primer selected must be compatible with finish coats of paints. Acceptable primers: Glidden Glid-Guard No. 5205; Sherwin-Williams Galvite B50 W3; Tnemec Galv-Guard Series 22; Southern Coatings Enviro-Guard 1-6227; or approved equivalent.

## **2.6 SHOP FABRICATION**

- A. Workmanship: Use materials of size and thickness shown, or, if not shown, of requirement size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately  $\frac{1}{32}$ -inch unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head screws or bolts.
  - 1. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

2. Cut, reinforce, drill and tap miscellaneous steel work as indicated to receive finish hardware and similar items.

## **2.7 SHOP PRIMING**

- A. Shop prime all miscellaneous steel work, except galvanized items or members or portions of members to be embedded in concrete and masonry and surfaces and edges to be field welded.
- B. Remove scale, rust and other deleterious materials before applying shop coat.
  1. Remove oil, grease and similar contaminants in accordance with SSPC-SP 1 Solvent Cleaning.
  2. Clean off rust and loose mill scale in accordance with SSPC-SP 2 Hand Tool Cleaning, or SSPC-SP 3 Power Tool Cleaning or SSPC-SP 7/NACE No. 4 Brush-Off Blast Cleaning.
- C. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 1.5 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
- D. Apply one shop coat of primer to all fabricated metal items. Apply second coat or primer to surfaces inaccessible after assembly and erection. Change of second coat to distinguish it from the first.

## **2.8 GALVANIZING**

- A. Provide a zinc coating for items shown and for items specified to be galvanized. Hot-dip galvanize after fabrication unless otherwise specified or indicated.
  1. ASTM A 153/A 153M for galvanizing iron and steel hardware.
  2. ASTM A 123/A 123M for galvanizing rolled, pressed and forged steel shapes, plates, bars and strips  $\frac{1}{8}$ -inch thick and heavier.
  3. ASTM A 123/A 123M for galvanizing assembled steel products.
- B. Galvanizing Repair Compound: High zinc dust content for regalvanizing welds and damaged galvanized surfaces. Provide ZRC by ZRC Chemical Products Co.

or Galvicon by Kenco Division of Southern Coatings.

**2.9 LOOSE BEARING AND LEVELING PLATES**

- A. Provide loose bearing and leveling plates for steel items bearing on masonry and concrete construction fabricate flat, free from warp and twist, and of required thickness and bearing areas. Drill plates to receive anchor bolts and for grouting as required. Galvanize items specified and items indicated.

**2.10 LOOSE STEEL LINTELS**

- A. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together, to provide pipe separators, to form a single unit where indicated. Space welds not over 12 inches apart unless shown otherwise. Provide not less than 8 inches bearing at each side of openings, unless otherwise shown. Galvanize loose steel lintels to be installed in exterior walls.

**2.11 SHELF ANGLES**

- A. Provide structural steel shelf angles of sizes shown for attachment to concrete framing.
- B. Galvanize shelf angles after fabrication where installed on exterior concrete framing.

**2.12 MISCELLANEOUS FRAMING AND SUPPORTS**

- A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
- B. Fabricate miscellaneous steel framing and support units to size, shapes and profiles shown, or, if not shown, of required dimensions to receive adjacent work and other work to be supported by framing. Except as otherwise shown, furnish units fabricated from structural steel shapes, plates and steel bars, and of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
- C. Galvanize miscellaneous frames and supports Specified and indicated. All items exposed to weather shall be galvanized.

**2.13 MISCELLANEOUS STEEL TRIM**

- A. Provide shapes and sizes for profiles shown. Except as otherwise noted, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work. Galvanize miscellaneous steel trim exposed to weather and other trim where indicated.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install manufactured items according to printed directions of the manufacturer except as specified otherwise or modified by details.
- B. Install, anchor and make field connections in accordance with approved shop drawings.
- C. To prevent electrolysis, separate contacting surfaces of dissimilar metals with one ply of 15-pound asphalt-saturated felt or a bituminous coating.
- D. Repair damaged areas of galvanized surfaces with galvanizing repair paint before and after installation.
- E. Use setting drawings, diagrams, templates, manufacturer's instructions and directions for installation of anchorages such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete and embedded in masonry.
- F. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop primer. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted field connections.
- G. Permanently weld shelf angles after last course of masonry immediately below the angle has been laid.
- H. Secure strap anchors to forms so shelf angles can be welded in place at proper elevation.

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- I. Existing steel embed members shall be cleaned and prepped to accept new welds.

**3.2 FIELD TESTS**

- A. Perform visual weld inspections of all field welds. Perform in accordance with AWS Standards.

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**SECTION 06 10 00**

**ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section includes the following:
1. Wood grounds, nailers, blocking, and panels with preservative-treated dimension lumber.
  2. Sheathing.

**1.2 RELATED WORK**

- A. The following Sections contain requirements that relate to this Section.
1. Section 07 13 28 - SELF-ADHERING MEMBRANE VENEER WALL FLASHING
  2. Section 07 60 00 - FLASHING AND SHEET METAL

**1.3 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

1. APA F405 Product Guide Performance Rated Panels

AMERICAN FOREST AND PAPER ASSOCIATION (AFPA)

1. Manual for Wood Frame Construction

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI B18.2.1 Square and Hex Bolts and Screws Inch Series
2. ANSI B18.6.1 Wood Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

1. ASTM A 153/A 153M Zinc Coating (Hot-Dip) on Iron and Steel Hardware

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2. ASTM A 307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
3. ASTM A 563 Carbon and Alloy Steel Nuts
4. ASTM C 79/C 79M Treated Core and Nontreated Gypsum Sheathing Board
5. ASTM C 1177 Glass Mat Gypsum Water-Resistant Gypsum Backing Panel
6. ASTM D 226 Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
7. ASTM E 84 Surface Burning Characteristics of Building Materials
8. ASTM E 96 Water Vapor Transmission of Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

1. AWPA C2-01 Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processing
2. AWPA C31-00 Lumber Used out of Contact with the Ground and Continuously Protected from Liquid Water - Treatment by Pressure Process
3. AWPA M4-01 Care of Preservative-Treated Wood Products

FEDERAL SPECIFICATIONS (FS)

1. FS FF-N-105 Nails, Brads, Staples and Spikes: Wire, Cut and Wrought

FLORIDA BUILDING CODE

1. Latest Issue with modifications and updates

SOUTHERN PINE INSPECTION BUREAU (SPIB)

1. Standard Grading Rules for Southern Pine Lumber  
U.S. DEPARTMENT OF COMMERCE PRODUCT STANDARDS (PS)
  1. PS-1 Construction and Industrial Plywood
  2. PS-20 American Softwood Lumber Standard

#### **1.4 QUALITY ASSURANCE**

- A. Lumber Standard: Comply with NBS Voluntary Product Standard PS 20, American Softwood Lumber Standard.
- B. Plywood Standard: Comply with U.S. Product Standard PS 1, Construction and Industrial Plywood.
- C. Wood Treatment: American Wood Preservers Association (AWPA).

#### **1.5 SUBMITTALS**

- A. Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the Board of Review of American Lumber Standards Committee.
- B. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.
  1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
  2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicate prior to shipment to project site.
  3. Warranty of chemical treatment manufacturer for each type of treatment.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other

panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

- B. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

## **PART 2 - PRODUCTS**

### **2.1 LUMBER, GENERAL**

- A. Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Inspection agencies and the abbreviations used to reference them with lumber grades and species include the following:
  - 1. SPIB - Southern Pine Inspection Bureau.
- C. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
  - 1. Provide dressed lumber, S4S, unless otherwise indicated.
  - 2. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.

### **2.2 DIMENSION LUMBER**

- A. For light framing (2 to 4 inches thick, 2 to 4 inches wide) provide the following grade and species:
  - 1. "Construction" Grade.1
  - 2. Southern Pine graded under SPIB rules or approved equivalent.

- B. For structural light framing (2 to 4 inches thick, 2 to 4 inches wide), provide the following grade and species:
  - 1. SPIB "No. 2" Grade
  - 2. Same species as indicated for structural framing grade below.

### **2.3 MISCELLANEOUS LUMBER**

- A. General: Provide lumber for support or attachment of other construction including wall caps, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: "Standard" grade light-framing-size lumber of any species or board-size lumber as required. "No. 3 Common" or "Standard" grade boards per WCLIB or WWPA rules or "No. 2 Boards" per SPIB rules.

### **2.4 CONCEALED PERFORMANCE-RATED CONSTRUCTION PANELS**

- A. General: Where plywood construction panels are indicated for the following concealed types of applications, provide APA F405 Performance-Rated Panels complying with requirements designated under each application for grade designation, span rating, exposure durability classification, edge detail (where applicable), and thickness.
- B. Wall Sheathing: APA F405 Rated Sheathing.
  - 1. Exposure Durability Classification: EXPOSURE 1.
  - 2. Provide marine grade plywood.
  - 3. Span Rating: As required to suit stud spacing indicated.

### **2.5 GLASS-MAT FACED GYPSUM SHEATHING**

- A. Gypsum sheathing manufactured with glass mats both faces and long edges on water-resistant treated core and in accordance with ASTM C 1177.

1. Type: Fire-rated at 5/8-inch thick.
  2. Edge and End Configuration: Square or V-shaped tongue and groove long edges, square ends.
- B. Dens-Glass Fireguard Sheathing by Georgia-Pacific or approved equivalent.

## **2.6 FASTENERS**

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153/A 153M or of AISI Type 304 stainless steel.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Wood Screws: ANSI B18.6.1
- D. Lag Bolts: ANSI B18.2.1.
- E. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

## **2.7 WOOD-PRESERVATIVE-TREATED MATERIALS**

- A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an

inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood nailers, curbs, support bases, blocking, stripping, and similar members in connection with flashing, and waterproofing.
  2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
- E. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWWA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

## **2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS**

- A. Sealant for Glass-Mat Gypsum Sheathing Board
1. Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated.
  2. Comply with requirements for elastomeric sealants specified in Division 7 Section - JOINT SEALANTS.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION, GENERAL**

- A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required to accurate fit. Correlate location of furring, nailers, blocking, grounds, and

similar supports to allow attachment of other construction.

- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.
- E. Countersink nail heads on exposed carpentry work and fill holes.
- F. Use fasteners indicated. Select fasteners of size that will not penetrate members where opposite side will be exposed to view. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

### **3.2 WOOD GROUNDS, NAILERS, AND BLOCKING**

- A. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.

### **3.3 GLASS-MAT GYPSUM SHEATHING**

- A. Seal over joints and around penetrations through this material.

END  
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**SECTION 07 11 14**  
**MASTIC DAMPPROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide brush or spray applied mastic dampproofing specified on exterior face of back-up wall to which masonry veneer will be applied, and other locations where indicated on drawings.

**1.2 RELATED SECTIONS**

- A. Section 07 13 28 SELF-ADHERING MEMBRANE VENEER WALL FLASHING.
- B. Section 07 60 00 - FLASHING AND SHEET METAL.

**1.3 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- 1. ASTM D 1187 Specification for Asphalt Base Emulsions for Use as Protective Coatings for Metal
- 2. ASTM D 1227 Specification for Emulsified Asphalt Used as a Protective Coating for Roofing

**1.4 SUBMITTALS**

- A. Manufacturer's Product Data: Submit data indicating compliance with specification, application and inspection instructions.
- B. Samples: Install on back-up surface of brick sample wall panel specified in Section 04 21 13.

**1.5 JOB CONDITIONS**

- A. Substrate: Install all penetrating items prior to application of dampproofing.
- B. Environmental Conditions: Apply dampproofing only

when temperature is 45°F. and rising. Apply only in dry weather.

**1.6 WARRANTY**

- A. Upon completion of the work, furnish to the owner the manufacturer's written and signed warranty against adhesive and cohesive failure of mastic dampproofing material for a period of two years. This warranty shall certify the properties of the products affecting their performance and that the products are used in accordance with the recommendations of the manufacturer.
- B. The contractor shall submit the following written and signed document to the Architect for delivery to the Owner.

-----  
**CONTRACTOR WARRANTY**

The undersigned warrants all materials furnished and work performed in the installation of mastic dampproofing on the \_\_\_\_\_ will remain free from leaks and other defects for a period of two years extending from the date of completion and acceptance of the mastic dampproofing and agrees during that period to make all necessary repairs and replacement of defective work, and all other work, exclusive of contents and furnishings damaged thereby, without additional cost to the Owner. This warranty shall have no dollar limit and shall cover all labor and materials required for repairs and replacement.

\_\_\_\_\_  
General Contractor

\_\_\_\_\_  
Dampproofing Contractor

\_\_\_\_\_  
Signed

\_\_\_\_\_  
Signed

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

- 
- C. Temporary repairs may be made by the Owner to meet emergency conditions without invalidating either of these warranties.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Type: Semi-fibrated asphalt emulsion.
- B. Emulsified Asphalt: ASTM D 1227, Type II, Class 1, fibrated (asbestos-free) mastic for brush/spray application.

**2.2 ACCEPTABLE MANUFACTURERS**

- A. Brush/Spray Mastic:
  - 1. Lambert Corporation: Waterban 60 SM.
  - 2. Karnak Corporation: #220AF or #83AF Fibered Dampproofing.
  - 3. BASF/Sonneborne Building Systems: Hydrocide 700B Fibered Mastic Dampproofing, reinforced with short fibers.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Clean surface of loose mortar, dirt and all other materials that will adversely effect the application of the mastic dampproofing. Cut out unsound conditions, clean and point concrete and masonry with neat cement or dry pack.
- B. Dampen all dry or porous masonry and concrete surfaces unless otherwise required by the manufacturer. Substrate shall be dry, clean, and free of cracks, voids, fins and other conditions which would prevent bond and application of uniform thickness of dampproofing.
- C. Prepare surfaces that have been previously coated with mastic. Remove loose material. Determine capability of new mastic to adhere to existing by analysis and/or testing of field sample/ Apply bonding agent or primer material as required to provide complete adhesion of new mastic.

**3.2 APPLICATION**

- A. If required by dampproofing manufacturer, prime surfaces to receive mastic dampproofing with a primer grade of the mastic dampproofing material in

the coverage recommended by the manufacturer.

- B. Brush or spray apply a single coat. Apply at a rate of 33-square feet per gallon to provide total dry film thickness of not less than 25 mils.
- C. Coating shall be continuous and free from breaks and pinholes. Spread coating into and around all slots, joints, and grooves.
- D. Coat exposed portions of all wall tie plates.

**3.3 CLEAN-UP**

- A. Remove excess material from adjacent surfaces and leave in unsoiled condition.

END  
KBJ-L&B Architects, LLC

**SECTION 07 13 28**

**SELF-ADHERING MEMBRANE WALL FLASHING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section includes self-adhering sheet membrane flashing at masonry cavity and veneer wall systems.
- B. Type of sheet membrane specified in this section is a self-adhering, self-healing, rubberized asphalt composite sheet.

**1.2 RELATED WORK**

- A. Section 07 60 00 - FLASHING AND SHEET METAL.
- B. Section 07 12 05 - FLUID APPLIED MEMBRANE WATERPROOFING.

**1.3 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- 1. ASTM D 96 Standard Test Methods for Water and Sediment in Crude Oil by Centrifuge Method (Field Procedure)
- 2. ASTM D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
- 3. ASTM D 746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

**1.4 SYSTEM PERFORMANCE**

- A. General: Provide sheet membrane flashing products that have been produced and installed to establish and maintain continuous watertight seals.

**1.5 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of Contract:
  - 1. Product data and general recommendations from membrane materials manufacturer for types of

dampproofing required.

2. Certification by membrane materials manufacturer that products supplied comply with local VOC regulations.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Obtain primary membrane materials of type required from a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Installer: A firm with not less than five projects similar to requirements for this project with satisfactory in-service performance and which is acceptable to primary membrane materials manufacturer.
- C. Verify that this product is compatible with the fluid applied membrane waterproofing.
- D. Preinstallation Conference: Prior to installation of membrane and associated work meet at project site with installer of each component of associated work, inspection and testing agency representatives and installers of work requiring coordination with membrane work. Review material selections and procedures to be followed in performing work. Notify Architect at least 48-hours before conducting meeting.

#### **1.7 PROJECT CONDITIONS**

- A. Substrate: Proceed with work after substrate construction, openings and penetrating work have been completed and areas are free of standing or running water, ice and frost. Verify that concrete is dry, smooth and free from sharp or ragged out-angles, honeycombing, rock pockets, depressions and projections.
- B. Verify that steel is dry, smooth and free from sharp projections.
- C. Weather: Proceed with membrane installation and associated work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.

#### **1.8 WARRANTY**

- A. Warranty: Submit a written warranty executed by the manufacturer, agreeing to repair or replace sheet membrane flashing that fails in materials or

workmanship within five years from date of substantial completion.

- B. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

## **PART 2 - PRODUCTS**

### **2.1 SELF-ADHERING MEMBRANE WALL FLASHING**

- A. Rubberized asphalt self-adhering membrane integrally bonded to polyethylene sheeting, formed into uniform flexible sheets of not less than 36 mils thick, complying with the following:
1. Tensile Strength: 250 psi minimum; ASTM D 412.
  2. Ultimate Elongation: 250 percent minimum; ASTM D 412.
  3. Brittleness Temperature: -25° F. (-32° C.); ASTM D 746.
  4. Permeance: Maximum 0.5 percent weight gain after 48 hours immersion at 70° F. (21° C.); ASTM D 96.

### **2.2 APPROVED MANUFACTURERS**

- A. Provide PERM-A-BARRIER membrane by W. R. Grace Construction Products or approved equivalent subject to compliance with requirements.

### **2.3 TERMINATION BAR**

- A. Provide aluminum (Alloy 6063) termination bars 1-inch wide, .090 inch thickness and 10'-0" in length.
1. Approved: Advanced Flashing Building Products, Inc. or approved equivalent.

### **2.4 AUXILIARY MATERIALS**

- A. Adhesives and Joint Tape: Provide types of adhesive compound and tapes recommended by dampproofing sheet manufacturer for bonding to substrate, for sealing seams in membrane and for sealing joints between membrane and flashings, adjoining surfaces and projections through membrane.

- B. Primers: Provide type of primer recommended by manufacturer of sheet membrane material for applications required.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. General: Comply with manufacturer's instructions for preparing surface. Chip off projections where necessary to properly place and adhere membrane sheet.
- B. Apply primer to substrate surfaces at rate recommended by manufacturer of membrane flashing materials. Prime only area that will be covered by membrane in same working day. Reprime areas not covered by membrane within 24 hours.

#### **3.2 INSTALLATION**

- A. Comply with manufacturer's instructions for handling and installing sheet membrane materials.
  - 1. Priming:
    - a. When substrate is dry and ready apply primer at a rate of 200-300 square feet per gallon using lambswool roller, brush, squeegee or spray apparatus.
    - b. Allow primer to dry for one hour or until tack free.
    - c. Prime only the area which can be covered with membrane in the same working day. Areas primed and not covered with membrane within 24-hours should be reprimed. Smoothness and porosity of the concrete will affect coverage rate.
    - d. Do not apply primer at heavier rates than recommended. Excessive material build-up will delay drying and membrane application.
  - 2. Flashing Membrane Installation:
    - a. Apply membrane horizontally.
    - b. Lap sides a minimum of 2½-inches and ends a minimum of 5-inches.
    - c. Use a hand roller or firmly press in the material as it is placed.



- d. All terminations of the membrane shall receive a bead of mastic. The bead should be trowelled to a flat surface approximately  $\frac{1}{8}$ -inch thick by  $\frac{3}{4}$ -inch wide. The mastic should be worked into cut edge terminations.
  - e. Patch all improperly lapped seams and damaged areas with small sections of membrane. The patch area should extend at least 6-inches beyond the defect.
  - f. Fishmouths and severe wrinkles shall be slit, flaps overlapped and repaired as above.
  - g. Treat inside and outside corners either with 12-inch strips. Place the membrane over the corner treatment.
  - h. Seal all laps occurring within 12-inches of a 90° change in direction with a trowelled bead of mastic.
- B. Coordinate installing membrane flashing materials with associated work to provide complete system complying with combined recommendations by manufacturers and installers involved in work. Schedule installation to minimize exposure of membrane materials.
- C. Seal projections through membrane and seal seams. Bond to vertical surfaces and also, where shown or recommended by manufacturer, bond to horizontal surfaces.
- C. Expansion Joints: Install joint filler with protruding rounded surface as recommended by manufacturer. Apply continuous 8-inch wide strip of membrane on joint, followed by membrane application.

### **3.3 PROTECTION**

- A. General: Protect completed membrane during installation of other materials or processes and throughout remainder of construction period.

END  
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**SECTION 07 16 16**

**CRYSTALLINE WATERPROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This specification covers the requirements relating to cementitious crystalline waterproofing treatment over concrete surfaces on interior walls and floor of elevator pit and as shown on the drawings and as specified herein.

**1.2 QUALITY ASSURANCE**

- A. Products shall be supplied in original undamaged containers with manufacturer's seals and labels intact. Store off ground in a dry enclosed area.
- B. Waterproofing shall be performed by a manufacturer's distributor licensed applicator or under the direct supervision of the distributor's representative, thoroughly experienced in the application of cementitious waterproofing materials.
- C. Curing compounds used shall be compatible with waterproofing and as recommended for use with the waterproofing products.

**1.3 SUBMITTALS**

- A. Certification by the manufacturer that products specified are suitable and intended for the use specified.
- B. Certification by the U.S. Environmental Protection Agency of approval of these products for use on concrete structures that hold potable water.
- C. Provide a Warranty, signed by both the manufacturer and the applicator, that the completed installation will perform it's intended function and remain waterproof for a period of five years from the date of acceptance by the Owner.

**PART 2 - PRODUCTS**

**2.1 APPROVED MANUFACTURERS**

- A. Basis of this specification are products manufactured by the Xypex Chemical Corp.

- A. Equivalent products subject to compliance with specified requirements.
  - 1. HEY'DI K-11 by Euclid Chemical Company.
  - 2. Penetron Crystalline by Penetron International, Ltd.

## **2.2 MATERIALS**

- A. Waterproofing: Cementitious crystalline type that chemically controls and permanently fixes non-soluble crystalline growth throughout the capillary voids of the concrete.
- B. Plugging: Fast setting hydraulic cement compound for plugging cracks or joints against the direct flow of water as manufactured by Xypex Chemical Corp. under the trademark of Patch'n Plug.
- C. Curing: Provide as required and as recommended by the manufacturer.

## **PART 3 - EXECUTION**

### **3.1 SURFACE PREPARATION**

- A. General: All surfaces to be waterproofed shall be examined for form ties holes and structural defects such as honeycombing, rock pockets, faulty construction, joint cracks, etc. These areas shall be repaired as follows:
  - 1. Repair of Surface Defects:
    - a. Form Tie Holes, Faulty Construction Joints, Cracks, Etc.: Chip defective areas in a "U" shaped slot 0.75 to 1.0 inch wide and a minimum of one inch deep. Wash wall with water and remove surface water, then apply one coat of Xypex Concentrate slurry at the rate of 1.5 lb./sq. yd. into the slot. Allow the slurry to reach an initial set, then fill cavity with Xypex Dry-Pac by pneumatic or hand packing.
    - b. Rock Pockets, Honeycombing or other Defective Concrete: Rout out defective areas to good concrete. Remove all loose material and saturate well with water. Remove surface water and apply one coat of Xypex Concentrate at the rate of 1.5 lb./sq.

yd. on routed areas. After slurry has set, but while still "green," fill cavity to surface with Xypex Patch'n Plug.

2. Coves, Sealing Stripes, Control Joints: Concrete surfaces which will come into contact with coves, sealing strips or control joints shall be prepared by the application of one coat of Xypex Concentrate in slurry form at the rate of 1.5 lb./sq. yd. Dry-pac or mortar shall be applied while the slurry coat is still "green" but after it has reached an initial set.

a. Coves: Xypex Modified mortar shall be trowelled and packed into a cove shape where indicated on the drawings.

b. Sealing Strips: Where shown on drawings preformed grooves 0.75 inch wide by a minimum of 1.0 inch deep, located at construction joints, shall be filled with Xypex Dry-pac and compacted tightly, using pneumatic packer or hammer and block.

**NOTE:** Placement of wooden slipforms for sealing strips shall be the responsibility of the General Contractor.

c. Expansion Joints: Treat as directed by the Manufacturer.

B. Surface Moisture: Apply waterproofing to "green" concrete as soon as possible after forms have been stripped, or to existing concrete which has been thoroughly saturated with clean water. Surfaces to be treated shall be moistened prior to application as required to insure proper migration of crystalline chemicals into the capillary voids in the concrete. Free water shall be removed prior to treatment.

### **3.2 MIXING OF WATERPROOFING CONCENTRATE**

A. General: Waterproofing shall be mixed by volume with clean water which is free from salt or other deleterious materials. Materials shall be mixed in clean containers in quantities which can be applied within 20-30 minutes from the time of mixing. As the mixture thickens it shall be stirred frequently, but no additional water shall be added.

B. Brush Application: Dry powder shall be measured and placed into the mixing container. Water shall be

measured and added into the powder and mixed by hand with a paddle or electric mixer (approx. 250 RPM). Mixing proportions are as follows:

| <u>COVERAGE</u> | <u>PROPORTIONS (By Volume)</u> |
|-----------------|--------------------------------|
| 1.5 lb./sq. yd. | 5 powder to 2 water            |
| 2.0 lb./sq. yd. | 3 powder to 1 water            |

- C. Spray Application: Mixing shall be the same as for brush application, except that a thinner mixture is required to spray from the professional spray equipment to be used. Follow spray equipment manufacturer's instructions. The following proportions are to be used as a starting guide:

| <u>COVERAGE</u> | <u>PROPORTIONS (By Volume)</u> |
|-----------------|--------------------------------|
| 1.5 lb./sq. yd. | 5 powder to 3 water            |

- D. Mixing Dry-Pac: Using a trowel, mix 6 parts of Xypex Concentrate powder to one part of clean water for 10 to 15 seconds. Lumps should be present in the mixture. Mix only enough which can be applied in 15 minutes.

### **3.3 APPLICATION**

- A. General: Application of all materials shall be done by or under the direction of a manufacturer's representative or a person who is thoroughly experienced in installation of cementitious waterproofing materials.
- B. Construction Joints: Waterproofing Concentrate in slurry form shall be applied at the rate of 2.0 lb./sq. yd. to all joint surfaces between pours. Care shall be taken to see that surfaces are properly moistened prior to application of slurry. Where joint surfaces are not accessible prior to pouring new concrete, the slurry shall be applied to the joint surfaces prior to erection of the formwork. If this is not possible, Xypex Concentrate in dry form shall be shaken from the upper formwork opening at the rate of 2.0 lb./sq. yd. prior to pouring the new concrete.
- C. Surface Application: After all repair, patching and sealing strip placement has been prepared in accordance with paragraph 4. herein all concrete surfaces to be treated shall have a Waterproofing Concentrate slurry applied at the rate recommended by the manufacturer.

1. Brushing: A semi-stiff short bristle brush or broom shall be used to work the slurry well into the surface of the concrete, filling hairline cracks and surface pores.
2. Spraying: Approved spray equipment may be used for larger jobs. Spray nozzle shall be held close enough to insure that slurry is forced into surface pores, hairline cracks, etc.
3. Second Coat: Modified Material Waterproofing shall be used, unless directed otherwise by manufacturer's representative, as a second coat and shall be applied while the first coat is "green," but after it has reached initial set. The rate of application is 1.5 lb./sq. yd.

#### **3.4 CURING**

- A. General: Curing shall begin as soon as the waterproofing materials have set up sufficiently so as not to be damaged by fine spray. Treated surfaces shall be fog sprayed three times a day for a two day period. In warm low humidity days more than 3 sprayings per day may be necessary. Damp burlap can also be used to cover the areas for the curing period of 2 to 3 days. Plastic sheeting may not be laid directly on the waterproofing material as it requires air contact to cure properly. The waterproofing shall be cured for 3 days and then allowed to set for 12 days.

End  
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**BENTONITE WATERPROOFING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide sodium bentonite waterproofing of concrete walls at exterior walls of elevator pit and as shown on drawings.

**1.2 SUBMITTALS**

- A. Submit manufacturer's product data and installation instructions and recommendations.
- B. Submit specimen copy of manufacturer's 5-year guarantee.

**1.3 JOB CONDITIONS**

- A. Apply waterproofing materials only when job conditions will permit work to be performed in accordance with manufacturer's recommendations.

**1.4 QUALITY ASSURANCE**

- A. Contractor shall provide the service of the manufacturer's representative to be at the site when waterproofing is installed and instruct applicator in proper application.
- B. Contractor shall submit a sample of soil and ground water to the waterproofing manufacturer to test soil and ground water for acid, alkaline, brine or other ground water contamination that would be detrimental to waterproofing material. Manufacturer shall acknowledge in writing acceptability or non-acceptability of the site conditions for use of bentonite waterproofing.

**1.5 GUARANTY**

- A. Provide 5-year written guaranty from the bentonite waterproofing system manufacturer. The guaranty shall include the following provisions:
  - 1. Waterproofed areas will remain watertight for the guarantee period.
  - 2. Should the waterproofed areas leak water into the structure, the guaranty shall cover cost of labor and materials to correct or replace

waterproofing and cover cost of removing and replacing other work required to replace waterproofing.

## **PART 2 - PRODUCTS**

### **2.1 APPROVED MANUFACTURERS**

- A. Volclay Bentonite Waterproofing System by CETCO Mineral Technologies is specified to establish type of system desired.
- A. Armor Clay Waterproofing System by Marflex.
- B. Mapeproof Bentonite Clay Waterproofing system by Mapei.
- D. Equivalent products of other manufacturers may be acceptable provided type of materials and associated components meet or exceed the requirements specified.

### **2.2 WATERPROOFING SYSTEM**

- A. System Components:
  - 1. Under Concrete Slabs Voltex composite geotextile fabric.
  - 2. Freestanding Walls: Voltex composite geotextile fabric as recommended by manufacturer for type of wall construction required.
  - 3. Seal for Key Joints at Wall to Slab and In Walls: Volclay Waterstop RX, expanding bentonite-based flexible waterstop.
  - 4. Sealing Material: Bentoseal, trowel grade sodium bentonite mastic joint seal.
  - 5. Sealing Wall/Footing Joints: Hydrobar tube, water soluble casing tube filled with bentonite.
  - 6. Protection Mat: Volclay Mat 10V; heavy geotextile protection course to protect installed Volclay panels from backfill damage.
- C. Concrete Fasteners: Washerhead concrete fasteners size recommended by manufacturer.

## **PART 3 - EXECUTION**

**3.1 SURFACE PREPARATION**

- A. Prepare surfaces in accordance with manufacturer's directions. Remove all rough areas, protrusions and fins. Concrete surfaces shall be free of voids.
- B. After forms are removed, apply Bentoseal to form-tie pockets, construction joints and honeycombs in concrete. Tapered form-tie holes extending through the wall shall be completely filled with non-shrink grout.

**3.2 KEY JOINTS**

- A. Place Waterstop RX in all formed key joints just prior to wall concrete placement.

**3.3 UNDER SLAB APPLICATION**

- A. Conform to manufacturer's recommendations and directions for each type installation. Provide fabric laps, joint treatment and moisture protection in accordance with manufacturer's directions.

**3.4 VERTICAL CONCRETE WALLS: FABRIC APPLICATION**

- A. Before installing the first course of Voltex, place hydrobar tubes at the wall/footing transition corner. Butt the ends of hydrobar tubes together to form a continuous line.
- B. Beginning at the bottom corner of the wall, install Voltex horizontally oriented. Cut the bottom edge of Voltex at the corner a minimum of 12-inches so that Voltex can be extended onto the footing. Fasten Voltex into position with washer headed fasteners a minimum of 24-inches on center. Cut and install a Voltex section over the uncovered footing corner area. Apply Bentoseal at the Voltex section to Voltex overlap at the corner.
- C. Install adjacent Voltex rolls of the bottom course horizontally oriented. Overlap the preceding roll a minimum 4-inches and extend onto the footing a minimum 12-inches. At inside corners apply a continuous 3/4-inch fillet of Bentoseal directly in the corner prior to installing Voltex. Stagger vertical overlap joints a minimum of 6-inches.
- D. Cut Voltex to closely fit around penetrations. After installing Voltex, trowel a minimum 3/4-inch thick fillet of Bentoseal around the penetration to completely fill any space between the penetration and the Voltex edge. Extend Bentoseal onto the

penetration and over the Voltex edge 1-1/2-inches. When hydrostatic conditions exist, the vertical wall Voltex shall cover the entire footing and overlap the underslab waterproofing a minimum 12-inches.

- E. Terminate Voltex at finished grade with a rigid termination bar fastened 12-inches on center. Embed top edge of Voltex in 2-inches wide by 1/2-inch thick layer of Bentoseal.
- F. Place backfill and compact following the application of each course of Voltex. Backfill shall consist of compactable soils, pea gravel, or crushed stone (3/4-inch or less). Compact soils to minimum 85% Modified Proctor density. Stone backfill larger than 3/4-inch shall require the use of a protection course. Avoid backfill with aggregate larger than 1-1/2-inches.

END  
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**SECTION 07 60 00**

**FLASHING AND SHEET METAL**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide each type of flashing and sheet metal work shown on the drawings and specified herein.
- B. Provide factory and shop fabricated flashing and sheet metal items. Work includes provisions for soffit closures, coping caps, metal flashing and sheet metal work indicated and required for a watertight system.

**1.2 RELATED WORK**

- A. Section 07 13 30 - SELF ADHERING MEMBRANE WALL FLASHING

**1.3 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- 1. ASTM A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- 2. ASTM B 32 Specification for Solder Metal
- 3. ASTM B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- 4. ASTM C 920 Specification for Elastomeric Joint Sealants
- 5. ASTM D 2822 Specification for Asphalt Roof Cement

SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA)

- 1. SMACNA Arc. Manual Architectural Sheet Metal

Manual

**1.4 SUBMITTALS**

- A. Manufacturer's Product Data: Submit data and installation instructions for each shop and factory fabricated item.
- B. Shop Drawings: Submit for shop fabricated items. Include details of expansion joints and details of installation and anchorage.

**1.5 STANDARDS**

- A. Conform to the following standards except as modified herein or indicated on drawings.
  - 1. SMACNA Architectural Manual

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Aluminum Sheet: ASTM B 209, 3004, thickness and finish as specified for each item.
  - 1. Fabricate sheet metal work that is specified or indicated to be exposed from coil coated sheet aluminum stock. Finish shall be a 70% Kynar500/Hylar5000 PVDF resin, thermo-cured, fluorocarbon coating system consisting of a 0.25 ±0.020 mil primer, a one-mil minimum color coat. Provide PPG Duranar or approved equivalent. Color shall be dark bronze to match existing, as selected by the Architect.
  - 2. Thickness: Provide 0.040-inch thick for exposed cap flashing, unless otherwise shown on drawings.
  - 3. Concealed masonry flashing shall be 0.030 mill finish aluminum.
- B. Fasteners for Wood Nailers: Provide screws or annular ring nails of same metal as sheet metal being fastened, except stainless steel fasteners may be used for all metals. Fasteners shall be sized for  $\frac{3}{4}$ -inch penetration into wood nailers.
- C. Fasteners, Concrete and Masonry: Provide drive pins that are set in predrilled holes with self-sealing, waterproof heads. Fasteners shall be made of a metal compatible with metal being fastened.

## **2.2 FABRICATED PRODUCTS**

- A. Shop fabricate metal flashing and other sheet metal items to comply with profiles and sizes shown and to comply with details and recommendations of SMACNA Manual or NRCA Manual as applicable. Provide folded flat-lock seams, and fold back metal to form a hem on the concealed side of exposed edges.
- B. Provide anchorage for each item so sheet metal is held in place with concealed fastening devices, except where exposed fasteners can not be avoided. Provide watertight joints that will allow expansion and contraction.
- C. Provide in 10-foot lengths except where shorter lengths are required.

## **2.3 WALL COPING, SHOP FABRICATED**

- A. Provide shop fabricated wall coping in the profile indicated.
- B. Provide expansion joints, joint covers, corners, anchors and fasteners. Joint covers shall be 6 inches long minimum.
- C. Material: Aluminum 0.040-inch thick. Finish shall be coil coated; Color shall be dark bronze to match existing.

## **2.4 MISCELLANEOUS FLASHING**

- A. Provide miscellaneous flashing and sheet metal in locations indicated and required for a waterproof system.

# **PART 3 - EXECUTION**

## **3.1 INSTALLATION**

- A. Comply with manufacturer's instructions and recommendations for handling and installation of fabricated flashing and sheet metal work.
- B. Flashing and sheet metal work shall be permanently water tight.
- C. Comply with details and profiles as shown and comply with SMACNA Manual or NRCA Manual details and recommendations for installation.
- D. Set sheet metal flanges in a trowel coat of roofing cement.

- E. Anchor sheet metal and flashing to substrates to hold straight and firm without sagging and buckling. Anchor metal flanges to wood nailers at 6 inches o.c. Anchoring shall conform to SMACNA manual.
- F. Provide for thermal expansion of sheet metal work in accordance with SMACNA manual.
- G. Conceal fasteners and expansion provisions wherever possible. Exposed fasteners shall have elastomeric washers as integral part of the head or be sealed with a sealant.
- H. Seal lap joints in metal and joints between metal and masonry, concrete, pipe and conduit with a sealant.

**3.2 DISSIMILAR METALS**

- A. Separate aluminum from copper and separate copper and aluminum from other metals by coating with a bituminous coating and one ply of 15-pound organic felt.
- B. Separate aluminum from cementitious surfaces and treated wood with a bituminous coating or one ply of 15-pound felt.

END

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**SECTION 07 92 00**

**JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Application of sealants at control and expansion joints on exterior vertical and horizontal intersections to provide a water and air tight barrier, as specified below and as noted on drawings.
- B. Associated materials and preparatory work to insure a successful sealant application.
- C. General Uses and Locations of Sealants:
  - 1. Elastomeric Sealants: Use for all exterior building and paving joints and for interior joints subject to movement and classified as follows by ASTM C 920:
    - a. Grade NS for vertical and inclined joints and joints in copings and sills.
    - b. Grade P, self leveling, for horizontal joints.
    - c. Type M or S, Class 25.

**1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 07 60 00 - FLASHING AND SHEET METAL.

**1.3 REFERENCES**

- A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
- B. ASTM D 2240 - Standard Test Method for Rubber Property-Durometer Hardness.
- C. ASTM C 1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
- D. ASTM C 719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
- E. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic

Elastomers-Tension.

- F. ASTM C 881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- G. ASTM C 510 - Standard Test Method for Staining and Color Change of Single or Multi Component Joint Sealant.
- H. Sealant, Waterproofing and Restoration Institute (SWRI) Sealant & Caulking Specification.

#### **1.4 SUBMITTALS**

- A. Product Literature: Product data sheets, color charts, and manufacturer's installation instructions.
- B. Samples: A 2-inch cured sample of each chosen color and type of sealant.

#### **1.5 QUALITY ASSURANCE**

- A. Compatibility with Substrate and Coatings:
  - 1. Applicator shall be responsible for verifying with sealant manufacturer that sealants used are compatible with joint substrates and coatings to which sealants will come in contact.
  - 2. Submit written certification from sealant manufacturer of acceptability for adhesion, staining, and compatibility with adjacent materials and finishes.
  - 3. Schedule sufficient time for the conducting of testing, certification of results and submission which will not cause a project delay.
- B. Applicator shall be responsible for providing a completely sealed building and ensure that all exterior joints between surfaces are properly sealed.

#### **1.6 MOCK-UP**

- A. Prior to installation of joint sealants, apply sealants to field constructed mock-ups to verify selections made in submittal process and to demonstrate aesthetic effects as well as qualities of material execution.

#### **1.7 QUALIFICATIONS**



necessary repairs and replacement of defective work, and all other work, exclusive of contents and furnishings damaged thereby, without additional cost to the Owner. This warranty shall have no dollar limit and shall cover all labor and materials required for repairs and replacement.

\_\_\_\_\_  
General Contractor

\_\_\_\_\_  
Sealant Contractor

\_\_\_\_\_  
Signed

\_\_\_\_\_  
Signed

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

-----

- D. Temporary repairs may be made by the Owner to meet emergency conditions without invalidating either of these warranties.
- E. The Contractor shall be responsible for damages to the building resulting from failure to prevent penetration of water during construction.

**PART 2 - PRODUCTS**

**2.1 SILICONE SEALANTS** (See schedule for each sealant type.)

- A. Type 1: ASTM C 920; low modulus, one component, non-sag, neutral cure silicone.
  - 1. Movement Capability: ASTM C 719; plus 100 percent to minus 50 percent; elongation, 1600% per ASTM D 412.
  - 2. Service Temperature Range: Minus 20 to 160 degrees F.
  - 3. Shore A Hardness Range: 15 - 20; ASTM D 2240.
  - 4. Staining: None; ASTM C 1248.
  - 5. Manufacturers: Dow Corning Corp. 790.
- B. Type 2: ASTM C 920; intermediate modulus, one component, non-sag, neutral cure silicone.

1. Movement Capability: Plus or minus 50 percent.
  2. Service Temperature Range: Minus 40 to 300 degrees F.
  3. Shore A Hardness Range: 30; ASTM D 2240.
  4. Staining: None; ASTM C 510.
  5. Manufacturers: Dow Corning Corp. 795, 995.
- C. Type 3: ASTM C 920; high modulus, one component, non-sag, acetox cure silicone.
1. Movement Capability: Plus or minus 25 percent.
  2. Service Temperature Range: Minus 35 to 140 degrees F.
  3. Shore A Hardness Range: 23; ASTM D 2240.
  4. Manufacturers: Dow Corning Corp. 999A; Pecora 863; GE 1200.
- D. Type 4: ASTM C 920; medium modulus, one component, non-sag, neutral cure silicone.
1. Movement Capability: Plus or minus 50 percent.
  2. Service Temperature Range: Minus 20 to 120 degrees F.
  3. Shore A Hardness Range: 25 - 30; ASTM D 2240.
  4. Staining: None; ASTM C 1248.
  5. Manufacturers: Dow Corning Corp. 791; GE Silpruf.
- E. Type 5: ASTM C 920; one component, low modulus silicone.
1. Movement Capability: Plus 100, minus 50 percent.
  2. Service Temperature Range: Minus 20 to 160 degrees F.
  3. Shore A Hardness Range: 15 - 20; ASTM D 2240.
  4. Manufacturers: Dow Corning Parking Structure Self Leveling.

- F. Type 6: ASTM C 920; one component, non-sag, sanitary silicone sealant.
  - 1. Movement Capability: Plus or minus 25 percent.
  - 2. Shore A Hardness Range: 20 - 20; ASTM D 2240.
  - 3. Manufacturers: Dow Corning Corp. 786, GE 1700, Percora 898.

## **2.2 POLYURETHANE SEALANTS**

- A. Type 7: ASTM C 920; medium modulus, two component, non-sag, polyurethane.
  - 1. Movement Capability: Plus or minus 50 percent.
  - 2. Service Temperature Range: Minus 20 to 120 degrees F.
  - 3. Shore A Hardness Range: 20 - 40; ASTM D 2240.
  - 4. Manufacturers: Sika Corporation, Sikaflex 2c; Tremco, Dymeric 241, Pecora, Dynatrol II.
- B. Type 8: ASTM C 920; low modulus, one component, non-sag, polyurethane.
  - 1. Movement Capability: Plus or minus 50 percent.
  - 2. Service Temperature Range: Minus 20 to 120 degrees F.
  - 3. Shore A Hardness Range: 25 - 25; ASTM D 2240.
  - 4. Manufacturers: Tremco, Vulkem 921, Sika Corporation, Sikaflex 15LM.

## **2.3 SPECIALTY SEALANTS**

- A. Type 9: Semi rigid, two component, epoxy joint filler.
  - 1. Movement Capability: N/A, designed for non-moving floor joints.
  - 2. Service Temperature Range: 40 to 120 degrees F.
  - 3. Shore A Hardness Range: 50 - 75; ASTM D 2240.
  - 4. Manufacturers: Euclid Chemical, Euco 700, Sika Corporation, Sikadur CJR LPL.
- B. Type 10: ASTM C 881; two component (security area)

pick proof epoxy sealant.

1. Service Temperature Range: 40 to 120 degrees F.
2. Manufacturers: Sika, Sikadur 23 Lo-Mod Gel.

C. Type 11: ASTM C 920; Polyurethane security sealant.

1. Movement Capability: Plus or minus 12.5 percent.
2. Service Temperature Range: Minus 20 to 120 degrees F.
3. Shore A Hardness Range: 49 - 60; ASTM D 2240.
4. Manufacturers: Pecora Corporation, Dynaflex; Sika Corporation, Sikaflex TR.

D. Type 12: ASTM C 920, Type S; single component, self-leveling, jet fuel resistant.

1. Movement Capability: Plus or minus 25 percent.
2. Service Temperature Range: Minus 40 to 170 degrees F.
3. Shore Hardness Range: 50 - 55; ASTM D 2240.
4. Manufacturer: Sikaflex-1c SL.

## **2.5 PRIMERS**

- A. Comply with manufacturer's instructions. Manufacturer shall be consulted for all surfaces not specifically covered in submitted application instructions.

## **2.6 BACKER ROD - TAPE**

- A. Closed-cell polyethylene; open-cell polyurethane; or non gassing, open-cell polyethylene soft-type backer rod as recommended by sealant manufacturer. Bond breaker tape shall be used to prevent three-sided adhesion in locations where backer rod cannot be used.

B. Acceptable Manufacturers:

1. Closed-Cell: ITP, Standard Backer Rod; Nomaco Standard Backer Rod.
2. Open-Cell: Denver Foam; ITP Tundra Foam; Nomaco.

3. Soft-Type: ITP Soft-type; Nomaco Soft-rod.
4. Bond Breaker Tape: Pecora Corp.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrate surfaces to ensure no bond breaker materials contaminate surface to which sealant is to adhere, and that unsound substrates are repaired.
- B. Verify joint dimensions are within manufacturer's acceptable tolerances, per manufacturer's submittal literature.

#### **3.2 PREPARATION**

- A. Protect adjacent exposed surfaces.
- B. Prepare joints in accordance with manufacturer's recommended instructions for maximum adhesion; prime as required by manufacturer.
- C. Consult manufacturer for surfaces not specifically covered in application instructions.
- D. Installation of sealant shall be evidence of acceptance of substrate.

#### **3.3 INSTALLATION: GENERAL.**

- A. Both temperature and dampness conditions may restrict application of these sealants. Comply with manufacturer's instructions.
- B. Sealant shall be mixed (if multi-component) and installed in accordance with manufacturers' recommendations and instructions to ensure complete mixing and an installed proper width/depth ratio with maximum adhesion contact. Prevent three-sided adhesion.

#### **3.4 BACKER ROD INSTALLATION**

- A. Backer rod shall be installed using only blunt or rounded tools which will ensure a uniform (+ or - 1/8") depth without puncturing the material. Backer rod shall be a minimum of 33% oversized for closed cell or soft rod and a minimum of 50% oversized for open cell backer rod, unless otherwise required by the manufacturer.



- B. Set backer rod at proper depth in the joint. Do not leave voids or gaps between the ends of joint filler.

### **3.5 SEALANT INSTALLATION**

- A. Deposit sealants in uniform, continuous ribbons without gaps with complete "wetting" of the joint bond surfaces equally on opposite sides. Fill sealant joint to a slightly concave surface, slightly below adjoining surfaces.
- B. Joint Size and Shape: Install sealants to depths recommended by sealant manufacturer. Fill joints to a depth equal to 50% of joint width, but no more than 50% of joint width, but nor more than ½-inch deep nor less than ¼-inch deep.
- C. Finished bead shall be smooth, free from wrinkles, air pockets, and foreign matter.

### **3.6 CLEANING**

- A. Remove excess material adjacent to joint.
- B. Remove unused materials from jobsite.

**3.7 SCHEDULE**

| JOINT TYPE                                 | SEALANT TYPE |   |   |   |   |   |   |   |   |    |    |    |    |    |
|--|--------------|---|---|---|---|---|---|---|---|----|----|----|----|----|
|  | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Structural Glazing                         |              | X |   |   |   |   |   |   |   |    |    |    |    |    |
| Glass to Glass (Non Structural)            |              |   | X | X |   |   |   |   |   |    |    |    |    |    |
| Perimeter Window Sealant                   |              | X |   | X |   |   |   |   |   |    |    |    |    |    |
| Aluminum to Brick                          | X            |   |   | X |   |   |   |   |   |    |    |    |    |    |
| Brick to Brick                             | X            |   |   |   |   |   | X |   |   |    |    |    |    |    |
| Wood to Wood                               |              |   |   | X |   |   |   | X |   |    |    |    |    |    |
| Metal to Metal                             |              | X |   | X |   |   |   |   |   |    |    |    |    |    |
| Metal to Stucco                            |              |   |   | X |   |   |   |   |   |    |    |    |    |    |
| Aluminum to Concrete                       | X            |   |   | X |   |   |   |   |   |    |    |    |    |    |
| Concrete to Concrete                       | X            |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Aluminum to Plaster                        | X            |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Stone to Stone                             | X            |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Aluminum to EIFS(note)                     |              |   |   | X |   |   |   |   |   |    |    |    |    |    |
| EIFS to EIFS (note)                        | X            |   |   | X |   |   |   |   |   |    |    |    |    |    |
| Paving on Grade                            |              |   |   |   | X |   |   |   |   |    |    |    |    |    |
| Interior Caulking                          |              |   |   |   |   |   |   |   |   |    |    |    |    | X  |
| Sanitary Sealant                           |              |   |   |   |   | X |   |   |   |    |    |    |    |    |
| Warehouse Floor Control Joints             |              |   |   |   |   |   |   |   | X |    |    |    |    |    |
| Pick Proof Security Joints                 |              |   |   |   |   |   |   |   |   | X  |    |    |    |    |
| Tamper Proof Security Joints               |              |   |   |   |   |   |   |   |   |    | X  |    |    |    |
| Interior Acoustical Joints                 |              |   |   |   |   |   |   |   |   |    |    |    | X  |    |
| Exterior Concrete Paving Joints - Airports |              |   |   |   |   |   |   |   |   |    |    | X  |    |    |

END  
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**SECTION 08 10 00**

**STEEL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide steel doors and frames, galvanized at exterior locations, as specified and indicated on drawings.

**1.2 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- |    |               |                                  |
|----|---------------|----------------------------------|
| 1. | ANSI/DHI A115 | Steel Door Preparation Standards |
| 2. | ANSI A250.8   | Standard Steel Doors and Frames  |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- |    |                   |   |
|----|-------------------|---|
| 1. | ASTM A 153/A 153M | Zinc Coating (Hot-Dip) on Iron and Steel Hardware   |
| 2. | ASTM A 366/A 366M | Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality   |
| 3. | ASTM A 568/A 568M | Steel, Sheet, Carbon and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for |
| 4. | ASTM A 569/A 569M | Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality                     |
| 5. | ASTM A 653/A 653M | Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process    |
| 6. | ASTM A 924/A 924M | General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip                                    |



1. Amweld Building Products, Inc.
2. Ceco Door Products; a United Dominion Company.
3. Curries Company.
4. Mesker Door, Inc.
5. Pioneer Industries, Inc.
6. Republic Builders Products.
7. Steelcraft; a division of Ingersoll-Rand.

## **2.2 MATERIALS**

- A. Hot-Rolled Steel Sheets: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569/A 569M and ASTM A 568/A 568M.
- B. Cold-rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366/A 366M and ASTM A 568/A 568M.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets, commercial quality, complying with ASTM A 653/A 653M, with ASTM A 653/A 653M or ASTM A 924/A 924M, G60 zinc coating, mill phosphatized.
- D. Supports and Anchors: Fabricate of not less than 18-gage galvanized sheet steel.
- E. Inserts, Bolts and Fasteners: Manufacturer's standard units hot-dip galvanized complying with ASTM A 153/A 153M, Class C or D as applicable.

## **2.3 DOORS AND PANELS**

- A. Provide steel doors of type indicated on drawings.
  1. Exterior Doors: Minimum 16-gage, ASTM A 653/A 653M, galvanized steel sheet face panels.
  2. Interior Doors: Minimum 18-gage, ASTM A 366/A 366M, cold-rolled steel face panels.
- B. Transom Panels: Fabricate same as door scheduled to have transom panel. Provide fasteners for attaching to frame.

## **2.4 STEEL FRAMES, WELDED**

- A. Provide metal frames for doors, transoms, sidelights, view windows and other openings

indicated on drawings.

- B. Fabricate frames with mitered corners, welded and ground smooth. Each jamb shall have 14 gage steel floor anchor welded to inside of jamb. All frames over 4-feet wide shall have 12 gage channel stiffener welded in head member.
- C. Door Silencers: Except on fire-rated frames, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.
- D. Plaster-Mortar Guards: Provide 26-gage steel guards welded to frame, at back of finish hardware cutouts to close off interior of openings and to prevent mortar from entering cutouts.
- E. Jamb Anchors: Fabricate of 16 gage steel minimum. Anchors in masonry and concrete shall be galvanized, T-shaped and corrugated or punched for embedding in mortar. Anchors for steel studs shall be T-shaped with integral stirrup straps for attaching to studs.
- F. Spreaders: Each welded frame shall be provided with a factory installed spreader bar at bottom of jambs.
- G. Provide UL labeled fire doors and frames where indicated.

## **2.5 FABRICATION**

- A. Fabricate door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Weld all seams and grind smooth.
- B. Doors:
  - 1. Full flush or seamless, seams and joints welded and ground smooth. All doors shall be sound deadened by filling core with non-combustible mineral fiber.
  - 2. Close top and bottom edges of exterior doors and panels as integral part of construction or with 14-gage steel channel flush welded into place and ground smooth.
  - 3. Glass Lites: Where glass lites are indicated, prepare openings in the factory and provide 20 gage steel moldings and stops attached with countersunk Phillips head screws. Galvanize frames and stops for all exterior doors.

4. Door Louvers: Provide sightproof stationary louvers in doors where indicated, fabricate of inverted Y-shaped blades formed of 16-gage steel set into 18-gage steel frame. Galvanize louvers and frames for all exterior doors.
- C. Frames: Form frames to profiles indicated. If not indicated provide 2-inch face by 5 $\frac{3}{4}$ -inch jamb depth, double equal rabbet, integral buck and stop frame with  $\frac{1}{2}$ -inch returns.
1. Fabricate all exterior frames, all frames in masonry and all frames over 4-feet wide of 16 gage steel.
  2. Fabricate interior frames (except frames in masonry) up to 4-feet wide of 18-gage steel; frames over 4-feet wide of 16-gage steel.
- D. Exposed Fasteners: Provide countersunk flat Phillips heads.
- E. Electric Preparation: Where electric strikes, locks and hinges are specified, furnish 16-ga. galvanized steel electrical outlet boxes with knock-outs and install at strike, lock and hinge locations. Extend empty e.m.t. conduit to head of frame.
- F. Shop Primer: Manufacturer's standard rust-inhibitive coating.

## **2.6 FINISH HARDWARE PREPARATION**

- A. Prepare doors and frames to receive finish hardware in accordance with approved Finish Hardware Schedule and templates provided by hardware supplier. Comply with ANSI/DHI A115 series. Reinforce doors and frames to receive surface-applied hardware. Locate finish hardware in accordance with referenced DHI Standard.

## **2.7 SHOP PRIME**

- A. Clean and treat all exposed steel surfaces including galvanized surfaces of mill scale, rust, oil and other foreign materials. Apply shop prime not less than 1.5 mils dry to provide uniformly finished surface ready to receive finish paint.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install steel doors, frames and accessories in accordance with approved shop drawings, referenced standards and manufacturer's data.

### **3.2 FRAME INSTALLATION**

- A. Comply with SDI-105, unless otherwise specified or indicated.
- B. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. Anchor floor anchors to floor with  $\frac{3}{8}$ -inch bolts and drilled-in steel expansion sleeves. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
  - 1. Jamb Anchors: Provide 3 jamb anchors per jamb for frames up to 7'-6". Install at hinge and strike levels. Frames to 8-feet shall have 4 anchors per jamb; frames over 8-feet shall have 5 anchors per jamb.
  - 2. In-Place Steel, Concrete and Masonry Construction: Set frames and secure to adjacent construction with machine screws and in-place type anchorage devices furnished by frame manufacturer.
  - 3. Metal Stud Partitions: Attach jamb anchors to studs with self-tapping screws.
  - 4. Masonry: Install anchors in masonry joints as masonry is laid up, fill frames with mortar.
- C. Fire Rated Frames: Install in accordance with NFPA 80.

### **3.3 DOOR INSTALLATION**

- A. Fit hollow metal doors accurately in frames, within clearances specified in ANSI A250.8.
- B. Fit fire-rated doors with clearances as specified in NFPA 80.

### **3.4 ADJUST AND TOUCH-UP**

- A. After erection, sand rusted and damaged areas smooth and touch-up all damaged primer.
- B. Adjustments: Check and readjust hardware so that doors operate as intended.



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**SECTION 09 24 25**

**STUCCO SOFFITS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Provide white Portland cement stucco soffits to match existing as specified and indicated on drawings.
- B. Provide stucco accessories specified and shown on drawings.

**1.2 REFERENCE STANDARDS**

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- |     |                   |  |
|-----|-------------------|--|
| 1.  | ASTM A 366/A 366M | Commercial Steel (CS) Sheet, Carbon (0.15 Maximum Percent) Cold-Rolled |
| 2.  | ASTM A 641/A 641M | Zinc-Coated (Galvanized) Carbon Steel Wire                             |
| 3.  | ASTM A 924/A 924M | Steel Sheet, Metallic-Coated by the Hot-Dip Process                    |
| 4.  | ASTM C 91         | Masonry Cement   |
| 5.  | ASTM C 150        | Portland Cement  |
| 6.  | ASTM C 206        | Finishing Hydrated Lime  |
| 7.  | ASTM C 847        | Metal Lath   |
| 8.  | ASTM C 897        | Aggregate for Job-Mixed Portland Cement-Based Plaster                  |
| 9.  | ASTM C 926        | Application for Portland Cement-Based                                  |
| 10. | ASTM C 1063       | Installation of Lathing and Furring to Receive                         |

Interior and Exterior  
Portland Cement-Based  
Plaster

METAL LATH/STEEL FRAMING ASSOCIATION, DIVISION OF  
NAAMM (ML/SFA)

1. ML/SFA 920                      Guide Specifications for  
Metal Lathing and Furring

**1.3        SUBMITTALS**

- A. Submit manufacturer's product data, specifications and installation instructions for each item and material required.
- B. Submit 12-inch long sample of each accessory.

**1.4        FIELD SAMPLE**

- A. Construct a 4-foot square sample of stucco on metal lath for Architect's approval of color and texture prior to starting stucco work.

**PART 2 - PRODUCTS**

**2.1        ACCESSORIES**

- A. Metal Stucco Accessories: Provide solid zinc accessories manufactured by Keene Penn Metal or approved equivalent.
  - 1. Corner Beads: Keene No. 1-X, 3-inch.
  - 2. Casing Bead: No. 66
  - 3. Control Joint: Keene No. X J15-3.
  - 4. Control Joint: Keene No. CJ series.
  - 5. Reveal Molding: Keene No. 40 with Modification No. 1 through 7 as required.
  - 6. Expansion Joint: Keene No. 40.
- B. Cornerite and Strip Lath: Shall be fabricated of galvanized sheet steel weighing 2.5-pounds per square yard minimum.

**2.2        LATH AND SUPPORT**

- A. Metal Lath: Conform to ASTM C 847, fabricated of ASTM A 366/A 366M steel sheet with ASTM A 924/A

924M, G60 galvanized coating. Provide 3.4-lb. paperback diamond mesh lath for suspended stucco and stucco on steel framing.

- B. Provide metal lath, steel framing, furring and supports in accordance with ASTM C 1063 and ML/SFA 920 specifications. All support framing shall be galvanized.
- C. Hanger Wire: ASTM A 641, Class I, galvanized steel wire, soft temper; 8 gage minimum size. Size of wire shall conform to Table 1, ASTM C 1063.
- D. Hanger Stiffeners: Provide STL-12 "Stiff Leg" by National Rolling Mills, Inc.

### **2.3 PORTLAND CEMENT STUCCO MATERIALS**

- A. Cement: ASTM C 150 Portland Cement, Type I or IA. Masonry Cement, ASTM C 91.
- B. Lime: ASTM C 206, Type S, special finishing hydrated lime.
- C. Aggregate: ASTM C 897, clean, natural or manufactured sand.
- D. Glass Fibers: Type AR, alkali-resistant, chopped 1/2-inch long. Provide Dur-O-Fibar by Dur-O-Wal, Inc. or approved equivalent.

### **2.4 STUCCO MIX**

- A. Provide materials complying with ASTM C 926.
- B. Base Coats: Conform to ASTM C 926, Table 3 for proportions by volume as applicable for the type base. Stucco mix shall contain 1½- to 2-pounds. of glass fiber per cubic foot of cementitious materials.
- C. Thickness: Conform to ASTM C 926, Table 1. Stucco applied over metal lath shall be 3 coat work, 7/8-inch thick.
- D. Finish coat: Conform to ASTM C 926, Table 4 for proportions by volume.
- E. Finish: White, sand float texture to match existing as approved by the Architect.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF ACCESSORIES**

- A. Anchor edge of flange of accessories 8-inches o.c. to plaster base.
- B. Miter or cope accessory corners and install with tight joints accurately aligned.
- C. Set accessories plumb, level and true to line, with tolerance of 1/8-inch in 10-feet.
- D. Install casing beads at terminations of stucco work, except where reveal molding or vent screeds are indicated and except where special screeds, bases or frames act as casing beads.
  - 1. Where sealant is indicated set casing bead  $\frac{1}{4}$ -inch from abutting frames and other work, for application of sealant.
  - 2. Where stucco abuts concrete or masonry set casing bead  $\frac{1}{4}$ -inch from concrete.
- E. Install control joints where indicated and where required by referenced standards.

### **3.2 METAL LATH AND FRAMING**

- A. Conform to ASTM C 1063 and ML/SFA for installation of steel framing and metal lath.
- B. Spacing of Framing: Conform to Table 1 and 2, ASTM C 1063 and ML/SFA 920.
- C. Hanger Wires: Size and spacing shall conform to Table 1, ASTM C 1063. Install stiff legs on all hangers in exterior stucco soffits.
- D. Install control joints where indicated on drawings. When not indicated, install in accord with ASTM C 1063.
- E. Stucco applied over concrete and concrete block shall be applied on self-furring, galvanized metal lath. Attach lath to concrete and masonry with self-threading screws in drilled holes and galvanized flat washers. Spacing shall be in accord with ASTM C 1063.

### **3.3 STUCCO INSTALLATION**

- A. Base Coats: Proportion and mix in accord with Table 3 of ASTM C 926 and apply in accord with Table 1 for base coat thickness of not less than  $\frac{1}{2}$ -inch for

solid bases and not less than  $\frac{3}{4}$ -inch for metal lath.

- B. Finish Coat: Proportion, mix and apply in accord with Table 4, ASTM C 926, but not less than  $\frac{1}{8}$ -inch thick.
- C. Curing: Cure stucco in accordance with ASTM C 926.

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**SECTION 09 91 13**

**EXTERIOR PAINTING**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. Metal doors and frames.
  - 2. Galvanized Steel Lintels.
  - 3. Other materials and surfaces scheduled.

**1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.
  - 1. Submit samples on rigid backing, 8-inches square.
  - 2. Step coats on samples to show each coat required for system.
  - 3. Label each coat of each sample.
  - 4. Label each sample for location and application area.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on drawings and in schedules.
  - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

**1.3 QUALITY ASSURANCE**

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45°F.
1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

**1.5 PROJECT CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50°F and 95°F.
- B. Do not apply paints in snow, rain, fog or mist; when relative humidity exceeds 85 percent; at temperatures less than 5°F above the dew point; or to damp or wet surfaces.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Products specified are by Sherwin-Williams Company.
- B. Subject to compliance with requirements, other manufacturers offering products that may be incorporated into the Work include the following:
1. Duron, Inc.
  2. ICI Devoe.
  3. PPG Architectural Finishes, Inc.

**2.2 PAINT, GENERAL**

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

### **2.3 METAL PRIMERS**

- A. Anti Corrosive Alkyd Metal Primer: MPI #79.
1. VOC Content: E Range of E1.
- B. Waterborne Galvanized-Metal Primer: MPI #134.
1. VOC Content: E Range of E2.
  2. Environmental Performance Rating: EPR2.

### **2.4 EXTERIOR LATEX PAINTS**

- A. Exterior Latex (Satin): MPI #11 (Gloss Level 3).
1. VOC Content: E Range of E2.

### **2.5 EXTERIOR WATER-BASED PAINTS**

- A. Light Industrial Coating (Gloss): MPI #164 (Gloss Level 5).
1. VOC Content: E Range of E2.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

### **3.2 PREPARATION**

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

### **3.3 APPLICATION**

- A. Apply paints according to manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface film without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

### **3.4 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from project

site.

- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### **3.5 EXTERIOR PAINTING SCHEDULE**

- A. Steel Substrates:
  - 1. Quick-Drying Enamel System: MPI EXT 5.1C.
    - a. Prime Coat: Alkyd metal primer.
    - b. Intermediate Coat: Water-based light industrial coating.
    - c. Top coat: Water-based light industrial coating.
  - 2. Color: Match existing.

END  
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**SECTION 14 24 24**

**HYDRAULIC PASSENGER ELEVATOR**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section includes the furnishing and installing of passenger hydraulic holeless elevator equipment as described.
- B. All terms of this specification shall have their meaning defined in the American Society of Mechanical Engineers Safety Code for Elevators and Escalators A17.1 and hereinafter referred to as the ANSI A17.1 Code, including all revisions and authorized changes to date.

**1.2 REFERENCE STANDARDS**

- A. The latest edition of publications listed below from a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- 1. ANSI/ASME A17.1 Safety Code for Elevators and Escalators

AMERICANS WITH DISABILITIES ACT (ADA)

**FLORIDA BUILDING CODE, 2017**

- 1. Chapter 11, Part A, Chapter 30]

**AMERICANS WITH DISABILITIES ACT (ADA)**

- 1. Accessibility Guidelines for Buildings and Facilities (ADAAG)

**1.3 STANDARDS**

- A. Regulatory Agencies and Standards: Comply with the following:

1. Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks, ANSI/ASME A17.1, including supplements. Referred to herein as the ANSI/ASME Code.
2. State of Florida Elevator Code, including Section 399.10 of Florida Statutes.
3. National Electrical Code, NFPA 70.
4. In the event of conflict, comply with the more stringent requirements.

**1.4 RELATED WORK BY OTHERS**

- A. General contractor shall provide the following in accordance with the requirements of the ANSI A17.1 Code plus applicable Model Building Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic elevators. State or local requirements shall be used if more stringent.
1. Clear, plumb hoistway, with variations not to exceed 1/2" at any point. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
  2. 75° Bevel guards on all projections, recesses or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
  3. Supports for rail brackets at pit, each floor and roof. Maximum allowable vertical spacing of rail supports, without backing. Divider beams between hoistway at each floor and roof, for guide rail bracket supports.
    4. Supports for holeless jack synchronization cables to hatch walls in overhead. Hoist beam shall be provided.
    5. Light outlet for each elevator, in center of hoistway (or in the machine room) as indicated by elevator contractor.



6. Recesses, supports, and patching, as required, to accommodate hall button boxes, signal fixtures, etc.
7. All barricades outside elevator hoistway as required.
8. Dry pit reinforced to sustain normal vertical forces from rails, holeless jack units and buffers. Pit floor to be level and free of debris.
9. Convenience outlet and light fixture in pit with switch located adjacent to the access door.
10. Where access to the pit is by means of the lowest hoistway entrance, vertical ladder of non-combustible material extending 42" minimum, 48" minimum for A17.1-2000 areas, above sill of access door or handgrips shall be provided to the same height.
11. Enclosed and protected machine room.
12. Access to the machine room and machinery space as required by the governing code or authority.
13. Lighting, convenience outlets, heating, cooling and ventilation of machine room, and machinery space. Machine room temperature to be maintained between 55 and 90 degrees F.
14. A fused disconnect switch for each elevator and light switch located per the National Electrical Code (NFPA No. 70), and where practical, located inside the machine room adjacent to the door.
15. Suitable copper feeder, ground and branch wiring circuits for signal system and power operated door, included main line switch. Feeder and branch wiring circuits for car light and fan, including main line switch.
16. Clear access above ceiling, or metal/concrete

raceways in floor, for oil line and wiring duct from machine room, if machine room is remote from elevator hoistway.

17. Convenience outlet and telephone outlet on control panel.
18. Cutout through machine room wall, 8" x 16", for oil line and wiring duct. Coordinate with elevator contractor at the building site.
19. All conduit and wire runs remote from either the machine room or the hoistway.
20. Heat, smoke or products of combustion sensing devices connected to elevator machine room terminals when such devices are required. Make contacts on the sensors should be sided for 120 volt D.C.
21. Furnish and install finished flooring in elevator cab.
22. Entrance walls and finished floors are not to be constructed until after door frames and sills are in place. Consult elevator contractor for rough opening size. When drywall construction is used, the general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained.
23. Where drywall or sheet rock construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
24. Door frames are to be anchored to walls and properly grouted in place to maintain legal fire rating (masonry construction).
25. The interface of the elevator wall with the hoistway entrance assembly shall be in strict compliance with the elevator contractor's requirements.
26. Filling and grouting around entrances by

general contractor as required.

27. For sill support by the elevator contractor, hoistway capable of accepting anchor stud type fasteners must be provided.
28. When fixtures are mounted in drywall, wall thickness may increase. The general contractor must coordinate requirements with the elevator contractor.
29. Where openings occur, all walls and sill supports must be plumb.

#### **1.5 QUALITY ASSURANCE**

- A. The elevator contractor shall be a company specializing in manufacturing and installing elevator equipment with not less than five years successful experience.
- B. All designs, clearances, construction, workmanship and material, unless specifically excepted, shall be in accordance with the requirements of the ANSI code, handicap accessibility, Americans with Disabilities Act and all codes having legal jurisdiction. The ANSI A17.1 Code shall govern except where codes having legal jurisdiction include more rigid requirements or conflict with the ANSI A17.1 Code.
- C. The elevator shall follow design and manufacturing procedures, certified in accordance with International Organization for Standardization (ISO9001-2000) to meet product and service requirements for quality assurance for new products.

#### **1.6 SUBMITTALS**

- A. The elevator contractor shall, after structural and architectural drawings are furnished, submit complete working drawings, showing the location of all equipment, loads, and all information necessary to render a totally functional elevator to the Owner.

- B. The elevator contractor shall provide finish samples upon request.
- C. The elevator contractor shall provide wiring diagrams.
- D. The elevator contractor shall provide Renewal Parts Catalogs and Maintenance Instructions.

**1.7 TEMPORARY USE**

- A. Temporary use of the car shall be negotiated with the elevator contractor if required and shall be in accordance with the terms and conditions of the elevator contractor's temporary acceptance form.

**1.8 WARRANTY**

- A. The elevator contractor shall guarantee the material and workmanship of the equipment installed by him under these specifications and make good any defects not due to ordinary wear or to improper use which may develop within one year after the completion of the installation or acceptance thereof by beneficial use, whichever is earlier.

**1.9 PROPRIETARY INFORMATION**

- A. Any proprietary material, information or data contained in the equipment, or any component or feature thereof, remains the property of the elevator contractor. This includes, but is not limited to, tools, devices, manuals, software, source codes, access codes, object codes, passwords and remote monitoring feature, which is deactivated if elevator contractor maintenance is discontinued.

**1.10 MAINTENANCE**

- A. The elevator included in these specifications shall receive regular maintenance on each unit for a period of 12 months after the completion of work described herein or acceptance thereof by beneficial use, whichever is earlier.
- B. Trained employees shall make periodic examinations and perform work including necessary adjusting,

greasing, oiling and replacing parts to keep the elevator in operation, except parts that require replacement because of accidents, vandalism, misuse or negligence by parties other than the manufacturer.

- C. The elevator contractor shall perform all work under this Agreement, except emergency minor adjustment call-back service, during regular working hours. The elevator contractor shall provide emergency minor adjustment call back service, during regular working hours.
- D. Should the Owner request that examinations, cleaning, lubrication, adjustments, repairs, replacements or emergency minor adjustment callback service (unless included above) be performed on other than the elevator contractor's regular working hours of his regular working days, the elevator contractor shall absorb the straight time labor charges and the owner shall compensate the elevator contractor for the overtime premium, travel time and expense at his normal billing rates.

## **PART 2 - PRODUCTS/OPERATIONS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with requirements, provide products of the following manufacturer:
  - 1. Thyssenkrupp Elevator Corporation: endura 3000 lb. Hole-Less Hydraulic with vandal resistant car and hall buttons, and suspended ceiling.
- B. Approved equivalent products by the following manufacturers are acceptable:
  - 1. Kone Elevator Corporation.
  - 2. Otis Elevator Corporation.

### **2.2 ELEVATOR SYSTEM AND COMPONENTS**

- A. Elevator Equipment Summary:

1. Building Occupancy Type: Office.
2. Application: Telescopic Holeless Dual Piston.
3. Service: General Purpose Passenger.
4. Quantity: 1.
5. Capacity: 3,000 lbs.
6. Speed: 100 fpm.
7. Travel: 14 feet ± verify.
  - a. Clear overhead 12'-2": Pit depth 5'-4"
8. Landings: 2.
9. Front Openings: 2.
10. Rear Openings: 0.
11. Door Type: Single Slide.
12. Operation: Microprocessor Single Car Automatic Operation.
13. Machine Room: Near to elevator hoistway.
14. Car Inside Size:
  - a. Bldg E: 6'-8" w x 4'-9" d.
15. Cab Height: 8'-0".
16. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
17. Hoistway Entrances: 3'-6" wide x 7'-0" high doors.
18. Power Supply: 208 Volts 3 Phase 60 Hz.
19. Contract Maintenance: 12 months with emergency callback, during regular working hours.

B. Operation:

1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

C. Additional Features:

1. Solid State Starting.
2. Anti-Stall Feature.
3. Braille and Audible Signals.
4. Door Open and Close Stall Protection.
5. Emergency Lighting.
6. Firefighter's Service Phase I and II, sensors by others.
7. Independent Service Feature.
8. Infrared Light Curtain Door Protection.
9. Low Oil Return.
10. Overload Sensors.
11. Phase Protection.
12. Certificate Frame.
13. Top of car inspection.
14. Hoistway Access Switch at floor(s) 1, 2.
15. Locking Service Panel in Car Operating Panel.
16. Power Unit Noise Reduction.
17. Pressure Switch.
18. Telephone (ADA compliant).

**2.3 MATERIALS AND COMPONENTS**

- A. Stainless steel shall have satin finish as specified herein. Baked enamel colors, if specified, shall be chosen by the architect from elevator manufacturer's standard color selections.
- B. Aluminum used for threshold and hoistway entrance sills shall be extruded; aluminum used for exposed frames in suspended ceilings shall be anodized.
- C. Plastic laminates shall be general purpose type and meet flame spread ratings as required by code. Pattern shall be selected from the elevator contractor's standard selection.
- D. Motors, pumps, valves, fluid tank, hydraulic fluid, microprocessor controller, controls, pushbuttons and wiring shall be UL or CSA approved.
- E. Spring buffers, attachment brackets and anchors shall be designed and sized according to code with safety factors.
- F. Pump shall be of the positive displacement screw type, designed for steady discharge with minimal pulsations.
- G. A muffler shall be provided to reduce noise transmission.
- H. Jack: A jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless. Two jacks piped together, mounted one on each side of the car with a polished steel hydraulic plunger housed in a sealed steel casing having sufficient clearance space to allow for alignment during installation. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each Jack Assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted



position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.

#### **2.4 CAB**

- A. Cab shall be 8'-0" high from finished floor to underside of canopy.
- B. Car Enclosure
  - 1. Walls: Cab type a laminate wall design, durable wood core finished on both sides with high pressure plastic laminate.
  - 2. Reveals and frieze: Not applicable
  - 3. Canopy: Cold-rolled steel with hinged exit.
  - 4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a factory applied powder coat finish.
  - 5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with No. 4 brushed stainless steel
  - 6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
    - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
    - b. Cab Sills: Extruded aluminum, mill finish.
  - 7. Handrail: Provide 1.5" diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, No. 4 brushed finish.
  - 8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
  - 9. Protection pads and buttons: Not required
- C. The cab finish flooring shall be furnished and installed by others.
- D. A certificate frame shall be provided.

#### **2.5 HOISTWAY ENTRANCES**

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
  - a. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
- B. Exposed areas of the corridor frames shall be finished in satin finish stainless steel on all floors.
- C. Doors shall be finished in stainless steel No. 4 brushed finish on all floors.
- D. Sills shall be extruded aluminum on all floors.

## **2.6 CAB FIXTURES**

- A. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons and illuminating indications shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
- B. The following cab fixtures shall also be provided:
  - 1. Car Lantern(s).
  - 2. Digital Car Position Indicator.
  - 3. Certificate Frame.
  - 4. Telephone (ADA compliant).

## **2.7 HALL FIXTURES**

- A. Provide a single button at each terminal floor at a height to comply with handicap requirements.
- B. Hall Button Fixtures shall be finished in satin finish stainless steel. Fixture cover plates shall

be mounted with tamper resistant screws in the same finish as the fixture.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- A. Prior to commencing elevator installation, inspect hoistway, hoistway openings, pits and machine rooms as constructed. Verify that hoistway, pit, machine room and openings are of correct size and within tolerance and are ready for work of this section. Notify General Contractor in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer. Arrange for temporary electrical power to be available for installation work and testing of elevator components.

#### **3.2 INSTALLATION OF ELEVATOR SYSTEM**

- A. Components will be arranged in machine room so equipment can be removed for repairs or replaced without dismantling or removing other equipment components.
- B. Coordinate elevator work with work of other trades, for proper time and sequence to avoid construction delays.
- C. Set entrances in vertical alignment with car openings, and aligned with plumb hoistway lines.
- D. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort. Adjust doors to prevent opening of doors at any landing on the corridor side unless the car is at rest at that landing, or is in the leveling zone and stopping at that landing. Adjust automatic floor leveling feature at each floor to achieve within 1/4" of the landing.

#### **3.3 PERMITS AND TESTS**

- A. The elevator contractor shall obtain and pay for all necessary Municipal and State permits and relating to the installation of the elevator at his expense, shall make all tests as required by governing codes in effect at the time of the award. The elevator contractor shall be reimbursed for any permits, tests or equipment necessitated by governing authorities after the date of the award.

END

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**STEEL PIN PILES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Steel pin piles shall be 12-ton capacity resistance piers installed to the depth required to achieve the 12-ton capacity with a minimum factor of safety of two.

**1.2 PREINSTALLATION MEETINGS**

- A. Pre-installation Conference - Conduct conference at Project site.

**1.3 SUBMITTALS**

- A. Pin Pile product data.
- B. Footing Bracket product data.
- C. Pier placement logs.
- D. Evidence that pin pile contractor has been engaged in successful installation of pin pile for at least five years.

**1.4 REFERENCES**

- A. ASTM Standard Specifications, most recent versions.
  - (1) ASTM A29 Standard Specification for Steel Bars, Carbon and Alloy, Hot Wrought and Cold Finished
  - (2) ASTM A36 Standard Specification for Carbon Structural Steel
  - (3) ASTM A53 Standard Specification for Welded and Seamless Steel Pipe
  - (4) ASTM A500B Standard Specification for Cold Formed Welded

and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

- (5) ASTM A513 Standard Specification for Electric Resistance Welded Carbon and Alloy Steel Mechanical Tubing
- (6) ASTM A572 Standard Specification for High Strength Low Alloy Columbium -Vanadium Structural Steel

### **1.5 DELIVERY, STORAGE and HANDLING**

- A. All pier materials shall be handled and transported carefully to prevent any deformation or damage. Care should be taken to prevent the accumulation of dirt, mud or other foreign matter on the steel materials. Such accumulation shall be completely removed prior to installation.

## **PART 2 - PRODUCTS**

### **2.1 PIER BRACKET**

- A. Standard 2-Piece Pier Bracket - The pier bracket for the 3-1/2" or 4" diameter pier shall be a welded assembly of 5/8" and 1/2" thick steel plates conforming to ASTM A36. The pier bracket shall provide 74 in<sup>2</sup> of bearing surface against the bottom of the footing and a minimum of 59 in<sup>2</sup> against the vertical face of the foundation. The pier bracket shall have guides for the top pier platform, two 9/16" diameter bracket mounting holes, two 11/16" diameter pier pin holes and six 1-1/32" diameter alignment and equipment mounting holes.

### **2.2 ANCHOR BOLTS**

- A. 2-Piece Underfooting Pier Anchor Bolts - Each underfooting pier bracket requires two 1/2" diameter by 5-1/2" long (minimum) steel concrete expansion bolts (four required for the 4-1/2" diameter heavy duty 2-piece pier), cadmium plated with an ultimate pullout capacity of 8,000 lbs. in 3,000 psi concrete. Minimum embedment shall be 3-1/2". The anchor bolts shall be supplied with a flat washer and nut. The drive stand requires two (minimum) 1/2" diameter by 5-1/2" long (minimum) steel concrete expansion bolts (Hilti Kwik Bolt II Expansion Anchors or equivalent) for

temporary mounting during pier installation. Bolts are required for mounting only.

### **2.3 GROUT (Optional)**

- A. Pressure Bearing Grout - Quick setting premixed mortar with a 4,500 psi minimum three day strength (Master Builder's 713 Non-Shrink Grout or equivalent).

### **2.4 DRIVE STAND ASSEMBLY**

- A. The drive stand assembly is a welded steel frame with a double acting hydraulic actuator capable of pressing the 42" long steel pier sections through the soil to a load bearing strata. The drive stand assembly is temporarily attached to the pier bracket by means of 1" diameter by 2-3/4" long high strength locking pins. Attach the drive stand assembly to the wall using two (minimum) 3/4" diameter by 7-1/2" long (minimum) anchor bolts to provide drive cylinder alignment and stability.

### **2.5 PIER SECTION**

- A. Standard Pier Section (3-1/2" Diameter x 0.300" Wall Thickness). Each pier section shall be fabricated from a 3-1/2" OD by 42" long mill rolled galvanized steel section with a 0.300" wall thickness. A triple coat corrosion protection of zinc chromate and clear polymer coating shall be provided. The initial section shall have a 4" OD by 1" long collar welded to the lead end of the pipe to assist in reducing wall friction during driving of the pier to capacity. The pier sections that follow shall each have a coupling welded to one end. Steel in this section shall conform to ASTM A500 Grade B.
- B. Pier Section (4" Diameter x 0.226" Wall Thickness). Each pier section shall be fabricated from a 4" OD by 42" long mill rolled steel section with a 0.226" wall thickness. The initial section shall have a 4-1/2" OD by 1" long collar welded to the lead end of the pipe to assist in reducing wall friction during driving of the pier to capacity. The pier sections that follow shall each have a coupling welded to one end. Steel in this section shall conform to ASTM A500 Grade B.

## **2.6 COUPLING**

- A. The pier coupling shall be a 6" long tubular steel section of suitable diameter to fit inside the pier section. The coupling shall be inserted and attached 3" inside one end of each pier section that follows the initial pier section. The remaining 3" of the coupling extends beyond the pier section. All components shall conform to ASTM A513 or ASTM A500 Grade B. The coupling shall be attached by an embossed mechanical connection or by plug welding the coupling to the pier pipe.

## **2.7 MODIFIED SLEEVE PIER SECTION**

- A. The modified sleeve pier section shall be fabricated from a 3-1/2" diameter, 0.216" thick wall or 4" diameter, 0.219-inch-thick wall mill rolled steel pipe, by 42 inches long. The pipe sleeve is mounted over the last pier section and is used to increase the moment transfer capacity from the Top pier Platform to the pier section. Steel in this section shall conform to ASTM A500 Grade B or A53.

## **2.8 PIER SLEEVING (Optional)**

- A. Pier sleeving is used to stiffen the segmented joints through areas of weak soils. Depending upon the product, the sleeve sections shall be fabricated from 3" diameter, Schedule 40 pipe, or 4" diameter, 0.219" thick wall mill rolled steel pipe, or 4-1/2" diameter, 0.237" thick wall mill rolled steel pipe 42" long. The sleeving shall be driven over the pier sections through any area of weak soils. The sleeving shall be installed in such a manner that the joints in the pier and the joints in the sleeving shall be staggered by at least 18". Steel in this section shall conform to ASTM A53, ASTM A500 Grade B.

## **2.9 TOP PIER PLATFORM**

- A. Top Pier Platform for Standard, Modified and Plate Piers - The standard pier platform shall be a welded assembly consisting of a steel tube of suitable size to fit over the pier section that shall form the cap cylinder. The length of the tube shall be 16-5/8" long for the 2-7/8" diameter pier products and 17-3/4" long for others with the exception of the 4" diameter modified pier system, which shall have a tube 41-3/4" long. The cap cylinder



shall have two 10" long (8" long for 2-7/8" diameter pier products) by 5/8" thick steel plates welded as vertical stabilizers to the sides of the steel cap cylinder. The top of the top pier platform shall be a 1" thick (3/4" thick for 2-7/8" diameter pier products) steel plate welded to the top of the cap cylinder. All steel elements shall conform to ASTM A36, ASTM A53, or ASTM A500 Grade B.

#### **2.10 HIGH STRENGTH PIER PINS - LOCK OFF BOLTS**

- A. High Strength Pier Pins for Standard, Modified and Plate Piers - Two 5/8" diameter by 3" long high strength, heat treated cadmium plated pier pins are required per pier. The pier pins conforming to ASTM A29 Grade 10B21 are required for each pier. The pins shall be quenched and tempered to HRC 36± and capable of providing 55,000 pounds of ultimate shear resistance in double shear configuration.

#### **2.11 LIFT SHIMS**

- A. The lift shims shall be 7 gauge, 5/8" by 1-1/2" long cadmium plated hot rolled steel. Lift shims are used as required up to a maximum height of 4"s. Final adjustments shall be made with one or two 16 gauge, 5/8" by 1-1/2" long cadmium plated hot rolled steel shims. The steel shall conform to ASTM A36.

#### **2.12 TWO PIECE LIFT HEAD ASSEMBLY**

- A. The two-piece lift head shall be a welded assembly that consists of 5/8" thick and 1" thick steel plates and is capable of providing the required resistance capacity for load transfer. The two-piece lift head assembly is temporarily attached to the pier bracket by means of six high strength pins and locking clips measuring 1" in diameter by 2-3/4" long (four required for the 2- 7/8" diameter products). The pins are inserted through matching 1-1/32" diameter holes in the pier bracket.

#### **2.13 LATERAL SUPPORT DEVICE**

- A. The lateral support device is a specialized tool used to provide a horizontal force to the bottom of the under-footing pier bracket during pier section installation. The lateral support

device helps counteract the torque developed between the structure and the pier bracket during pier section installation. The lateral support device is a welded assembly of steel plate and tubing. Its length is adjustable by means of a hand thread and a steel pin inserted through adjustment holes in the lateral support device.

## **2.14 WELDMENTS**

- A. All welded connections shall conform to the requirements of The American Welding Society (AWS) publication "Structural Welding Code AWS D1.1", and applicable revisions.

## **PART 3 - EXECUTION**

### **3.1 EXPOSURE of FOOTING or GRADE BEAM**

- A. An area shall be excavated immediately adjacent to the building foundation to expose the footing, bottom of mat or to a width of at least 36" and at least 15" beneath the proposed elevation of the base of the pier bracket. A chipping hammer shall be used to smooth and prepare the foundation for mounting of the pier bracket. The footing or wall shall be smooth and vertical at the mounting location for the plate pier bracket. The vertical and bottom face of the footing shall, to the extent possible, be smooth and at right angles to each other for mounting the under-footing bracket. The surfaces shall be smooth, free of all dirt, debris, and loose concrete so as to provide firm bearing surfaces for the pier bracket.

### **3.2 INSTALLATION of the PIER BRACKET**

- A. Installation of the Under-Footing 2-Piece Pier Bracket - The pier bracket shall be temporarily mounted to the drive stand assembly using 1" diameter pins and retaining clips. The assembly is lowered into the excavation adjacent to the foundation. The pier bracket shall then be positioned and seated flush against the face and bottom of the footing using a hydraulic actuator or ram. The pier bracket is then fastened to the footing with two expansion anchor bolts. If the pier bracket does not have continuous bearing support on either the vertical or horizontal face, then pressure bearing grout shall be used to provide proper

bearing prior to driving the pier. Care should be exercised to ensure that the drive stand assembly frame is plumb prior to driving each pier section. A carpenter's level may be used to verify vertical alignment in both planes.

- B. Install a lateral support device between the bottom, front side of the pier bracket and the vertical wall of the excavation opposite the pier. During installation of the pier sections, maintain support against the pier bracket with the lateral support device.
- C. Installation of the 2-Piece Plate Pier Bracket - A bolt template shall be prepared to properly locate, mount and align the pier bracket at the location directed by the designer and, if a spread footing is present, directly over a cored hole installed through the footing element. When the anchor bolt locations are marked, the four 3/4" diameter x 7-1/2" long bolts shall be installed to a minimum embedment of 4-3/4" and the four 1" diameter x 9" long bolts shall be installed to a minimum embedment of 5-1/2" into the vertical face, unless otherwise directed by the engineer. (Note: The AP-2-PP-2875.165 pier requires only 3/4" diameter bolts.) The plate pier bracket shall be installed with the nuts and washers provided with the anchor bolts. The longer bolts mount to the lower holes. Follow manufacturer's recommendations for bolt installation and maintain maximum embedment of the bolts. If the pier bracket does not have continuous bearing support on the vertical face, then pressure bearing grout shall be used to provide proper bearing prior to driving the pier. Care should be exercised to ensure that the pier bracket is plumb. A carpenter's level may be used to verify the vertical alignment.

### **3.3 DRIVING and TESTING PIER SECTIONS**

- A. Driving of Pier sections - All pier sections shall be continuously driven by use of the drive stand and hydraulic cylinder assembly. The initial pier section shall have the friction reduction collar on the bottom end. Additional pier sections shall be added as the pier driving operation continues. Driving of the pier sections will continue until rock or a suitable bearing stratum is reached as defined by a force equal to 1.65 times the working load specified by the engineer or until lift of the structure is achieved, whichever is less.

B. If the maximum hydraulic cylinder operating pressure is reached prior to bearing stratum verification, remove the double acting hydraulic actuator from the drive stand assembly and replace it with a 2" x 4" x 7-1/8" supplemental block. Install a 25 or 50-ton hydraulic ram (depending upon Proof Load force required) between the last pier section and the supplemental block. The hydraulic ram shall be actuated with a hand pump until bearing strata is verified as defined by a maximum installation force of 1.65 times the designed working load. The installation force shall not exceed:

|                                      |             |
|--------------------------------------|-------------|
| 3-1/2" O.D. x 300" wall pipe section | 75,075 lbs. |
| 4" O.D. x 226" wall pipe section     | 84,975 lbs. |

or until lift of the structure is achieved, whichever is less.

C. Proof Load Testing (Optional) - To accomplish field load testing of the installed pier, provide bearing capacity confirmation of 1.5 times the designed working load. This operation verifies a Factor of Safety of 1.5:1 on the field installation.

D. Proof Loading the pier may be accomplished by either installing a 2" x 4" x 7-1/8" supplemental block in place of the hydraulic drive cylinder on the drive stand or mounting a lift head on the pier bracket of existing work. Install a 25 or 50-ton hydraulic ram (depending upon Proof Load force required) between the pier and the supplemental block or lift head. The hydraulic ram shall be actuated with a hand pump until bearing strata is verified as defined by a maximum installation force of 1.5 times the designed working load not to exceed 1.5 times the maximum published working capacity. Do not exceed these maximum Proof Loads:

|                                      |             |
|--------------------------------------|-------------|
| 3-1/2" O.D. x 300" wall pipe section | 68,250 lbs. |
| 4" O.D. x 226" wall pipe section     | 77,250 lbs. |

or until lift of the structure is achieved, whichever is less.

E. Cutting Final Pier Section - It is likely that the final installed pier section will have to be removed from the hole and cut to a length suitable to provide space for installing the top pier platform. Mark and cut the pier section to the proper length using a metal cutting saw capable of a smooth cut at 90° to the length of the pier section. After cutting to length, the final

pier section is replaced. Note: If modified sleeving is to be installed, the pier pipe shall be cut 1" shorter to allow clearance of the internal ring of the modified sleeve pipe.

F. Drive Equipment Removal - The drive stand assembly is then removed from the pier bracket by removing the 1" diameter locking pins.

### **3.4 DRIVING of PIPE SLEEVE (Optional)**

A. When the capacity of the pier is achieved, the drive stand assembly is used to push the pier sleeving over the last pier section(s). Locate the modified sleeve that contains an internal ring at one end and reserve it as the last piece of sleeve to be installed. This sleeve will likely need to be cut to ensure that the joints between the pier pipe and sleeving do not align. The joints between the pier sleeves and pier sections should be staggered a minimum of 18". Prior to driving any of the plain sleeving (without internal ring), measure the length of the final piece of pier pipe that was cut in section 3.3.3 above. Cut the modified sleeve pipe (that contains the internal ring) as follows:

- (1) If the final length of pier pipe is less than 24" but greater than 18" long, the full length of the modified sleeve is required. Do not cut the modified sleeve pipe.
- (2) If the final length of pier pipe is less than 18" long, cut the length of modified sleeving to a length of 18" plus the final length of pier pipe (measuring from the end of the modified sleeve that contains the internal ring).
- (3) If the final length of pier pipe is more than 24" long, cut the length of modified sleeving to a length of 42" minus the final length of pier pipe (measuring from the end of the modified sleeve that contains the internal ring).

B. Installation of sleeve pipe shall be as follows: Install the length of sleeve pipe left over from cutting the modified sleeve followed by the required full lengths of sleeve pipe and then the modified sleeve section with the internal ring. The internal ring shall bear upon the top of the pier pipe when fully installed.

- C. The drive stand and hydraulic cylinder assembly with the proper drive head attached to match the sleeve pipe diameter shall be used to push the modified sleeving over the pier sections. Sleeving shall extend to the depth specified by the engineer, but in no case less than the depth of the proposed cut, exposure, or thickness of weak soil plus three feet. DO NOT exceed the manufacturer's rated operating capacity for the hydraulic cylinder during installation of sleeve pipe. When the pipe sleeve(s) are installed, the drive stand assembly is removed from the pier bracket by removing the 1" diameter locking pins.

### **3.5 INSTALLATION of the TOP PIER PLATFORM**

- A. The top pier platform shall be installed over the last installed pier section. Align the vertical stabilizers of the top pier platform within the channels on the legs of the pier bracket and tap the top pier platform until it contacts the top of the final pier section. A small port is provided between the cap cylinder and the platform to verify contact.

### **3.6 INSTALLATION of the TWO-PIECE LIFT HEAD ASSEMBLY**

- A. The two-piece lift head assembly is temporarily attached to the pier bracket by aligning the holes in each piece. One inch diameter pins and clips are used to align and temporarily hold the two pieces together.

### **3.7 LIFTING and HOLDING**

- A. The lifting and holding operation is designed to raise the structure and to restore it to as close to the original elevation as the construction will allow. Normally this lifting and holding operation is accomplished with several simultaneous pier placements. Install a 25 to 50-ton hydraulic ram as required between the two-piece lift head assembly and the top pier platform on each pier. Install 3-1/2" square by 3/4" pier shims, or equivalent, to reduce excess space between the ram and the two-piece lift head assembly. This increases the effective ram strokes. The rams shall be actuated simultaneously to raise the structure. Lifting shall continue until the structure is restored to its approximate original elevation or to design specifications. When restored, the lifting forces and amount of lift is documented.

- B. Install the cadmium plated lift shims above the vertical stabilizer plates of the top pier platform. The maximum allowable height of shims that will maintain published ratings of the pier system is 4". The 7 gauge shims shall always be stacked to provide the required height. The 16 gauge shims are only used for fine adjustments between the stack of 7 gauge shims and the bottom of the pier pins or bolts. Install two high strength pier pins into the holes in the pier bracket by tapping the high strength pier pins into place. There must be a snug fit of the high strength pier pins and the lift shims. The taper pins shall be installed fully until the head contacts the bracket. The load shall then be transferred to the pier system by removing the pressure from the hydraulic rams. Remove the ram and then remove the 1" locking pins and the two-piece lift head assembly from the pier bracket.

### **3.8 DOCUMENTATION**

- A. The installer shall carefully monitor the driving force applied to the pier sections as the pier is installed. It is recommended that the driving force be recorded at 3-1/2 foot intervals unless directed otherwise by the engineer. The form of the data may be as directed by the customer or the engineer.
- B. The lifting force, lift, and pier depth shall also be recorded and presented in a tabular form. In addition, the installer shall know and have calculated the desired terminal pressure that will create the desired Proof Load Test force approved by the engineer prior to beginning the pier installation.

### **3.9 CLEAN UP**

- A. When all of the equipment has been removed, the area shall be backfilled using the previously excavated soil. The excavations shall be backfilled by placing no more than 8" of loose material in a lift and compacting that soil prior to placement of the next 8" lift. Sufficient lifts shall be used to restore the ground to its original elevation and density. Slope the soil contour around the perimeter of the structure for drainage away from the foundation. Dispose of all waste in a legal manner.

END

